US006516157B1

(12) **United States Patent**
Maruta et al.

(10) **Patent No.: US 6,516,157 B1**
(45) **Date of Patent: Feb. 4, 2003**

(54) **PRINTING SYSTEM THAT CALCULATES PRINTING COST USING DATA INPUT VIA A REMOTE DATA INPUT TERMINAL AND RETURNS CALCULATED PRINTING COST TO THE REMOTE DATA INPUT TERMINAL**

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(73) Assignee: **Minolta Co., Ltd.**, Osaka (JP)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/567,012**

(22) Filed: **May 9, 2000**

Related U.S. Application Data

(63) Continuation of application No. 09/079,524, filed on May 15, 1998, now Pat. No. 6,064,838.

(30) **Foreign Application Priority Data**

May 16, 1997 (JP) 9-143551
Dec. 3, 1997 (JP) 9-332809

(51) **Int. Cl.**[7] **G03G 21/02**
(52) **U.S. Cl.** **399/8**; 399/79
(58) **Field of Search** 399/79, 80, 8, 399/81; 379/91.01, 100.04; 705/1, 30; 358/1.16, 1.17

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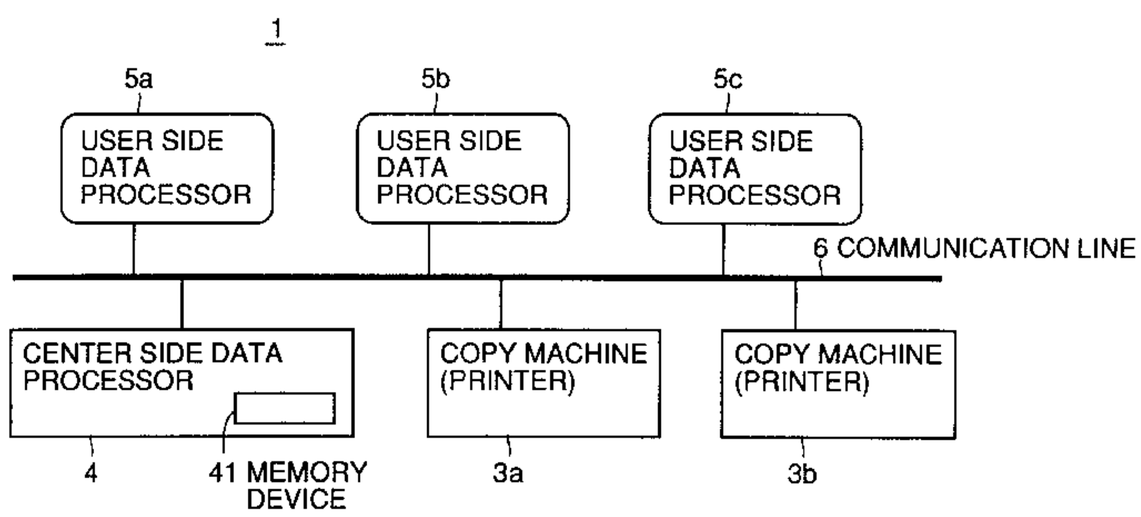
Primary Examiner—Robert Beatty
(74) *Attorney, Agent, or Firm*—McDermott, Will & Emery

(57) **ABSTRACT**

A printing system includes a printer, a center side data processor, and a remote user side processor (input terminal) all interconnected via a network. A print request and information related to a printing operation is sent from a user side processor to a reception device at the center side data processor. A printing cost is calculated and transmitted back to the user side processor via the network. Upon determination that payment has been received, the front data is sent to the printer for printing. The period of time of retaining the print data 8 is modified depending upon whether payment has been received.

14 Claims, 35 Drawing Sheets



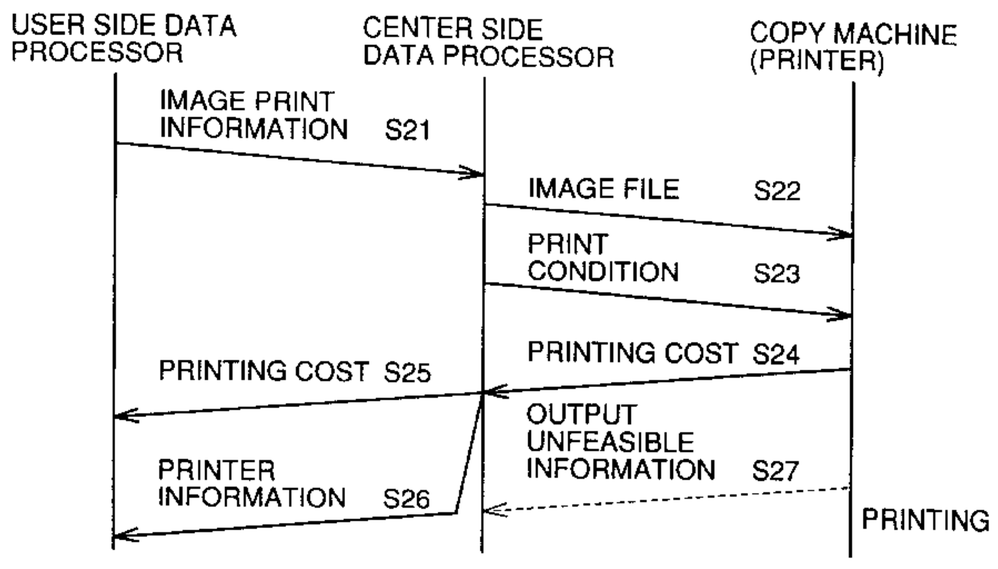


FIG. 1

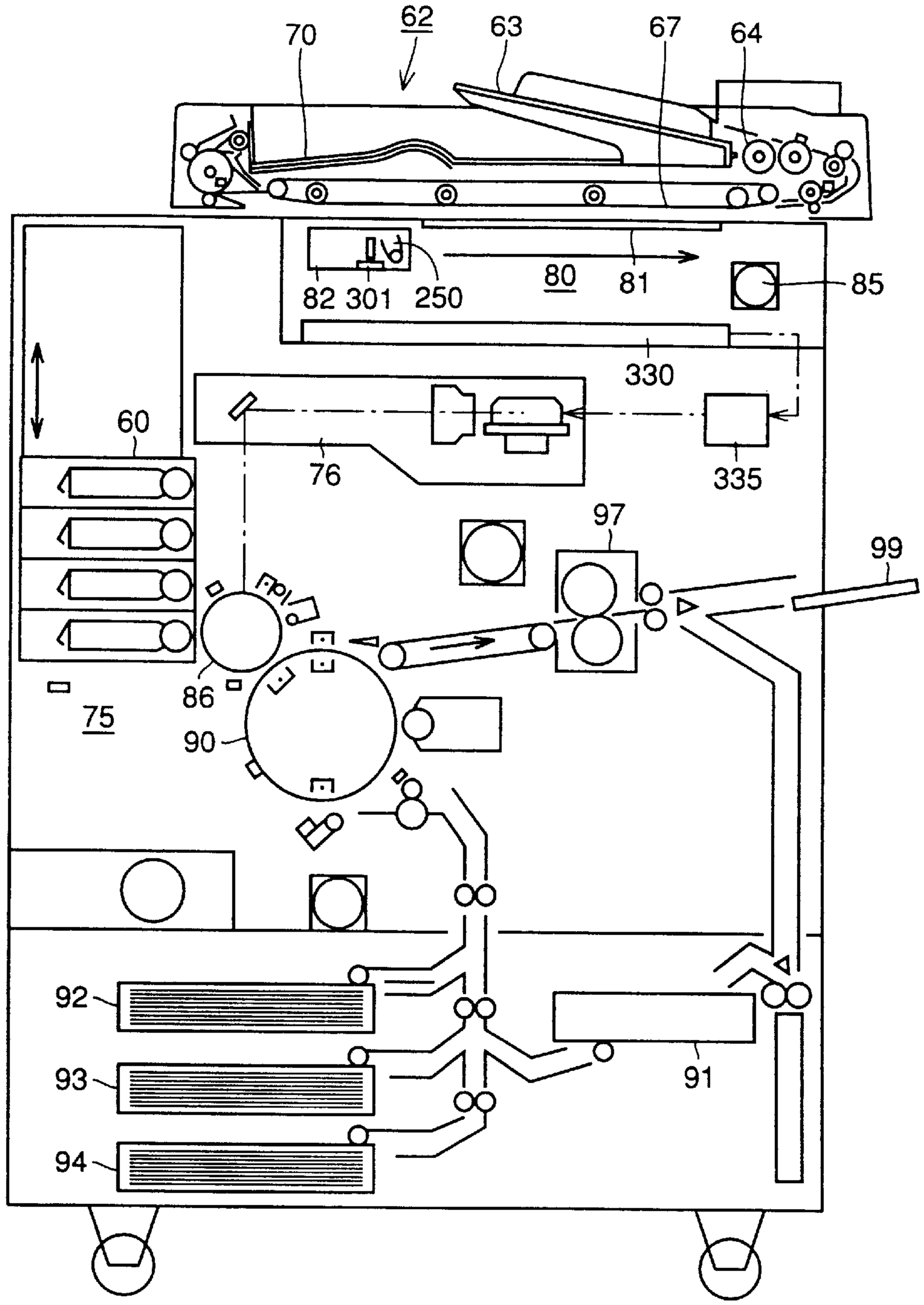
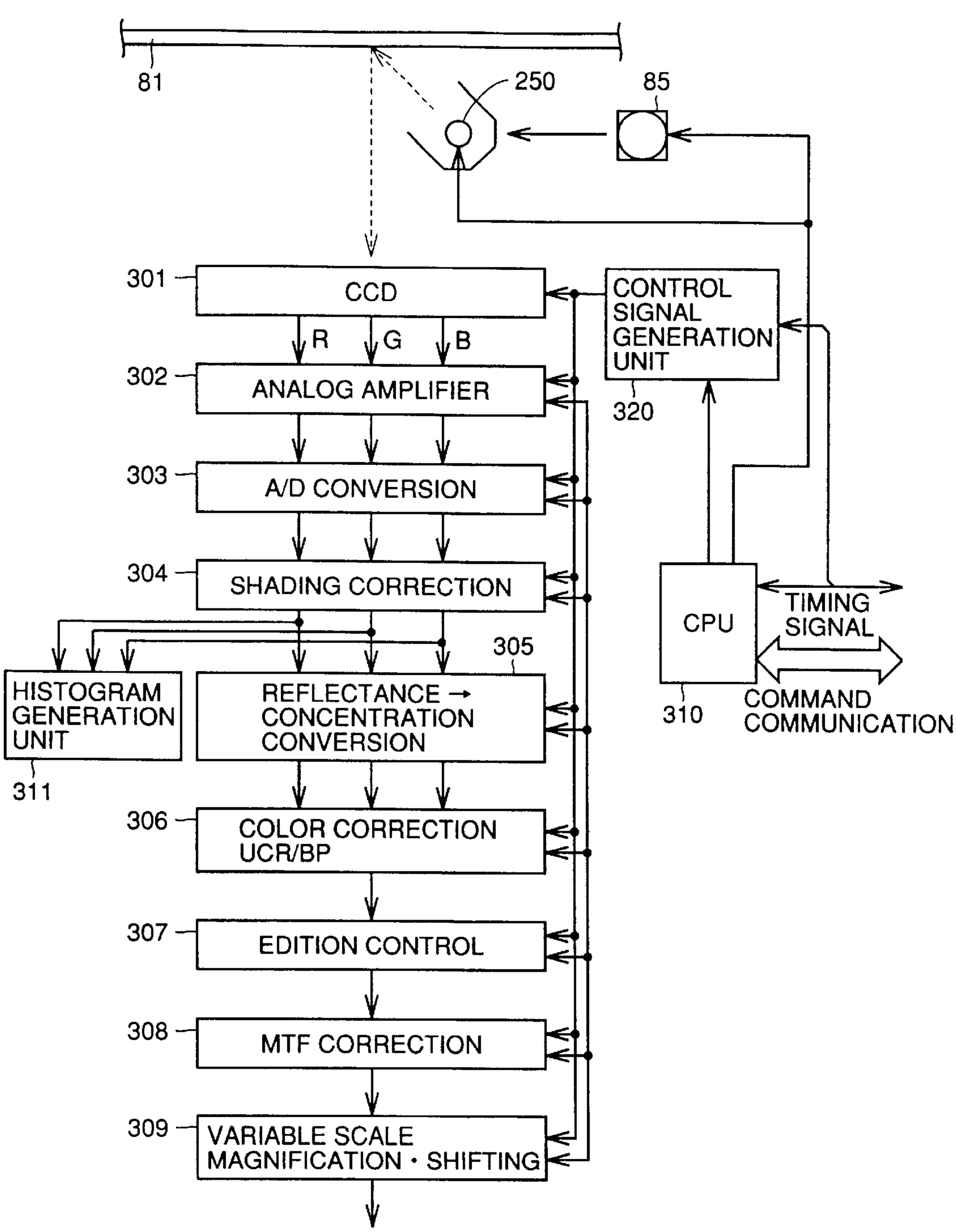

70
62
63
67
64
82
301
250
80
81
85
330
60
76
335
97
99
86
75
90
92
93
94
91

FIG.2


81
250
85
301
CCD
R
G
B
302
ANALOG AMPLIFIER
303
A/D CONVERSION
304
SHADING CORRECTION
CONTROL SIGNAL GENERATION UNIT
320
CPU
TIMING SIGNAL
COMMAND COMMUNICATION
310
305
HISTOGRAM GENERATION UNIT
311
REFLECTANCE → CONCENTRATION CONVERSION
306
COLOR CORRECTION UCR/BP
307
EDITION CONTROL
308
MTF CORRECTION
309
VARIABLE SCALE MAGNIFICATION · SHIFTING

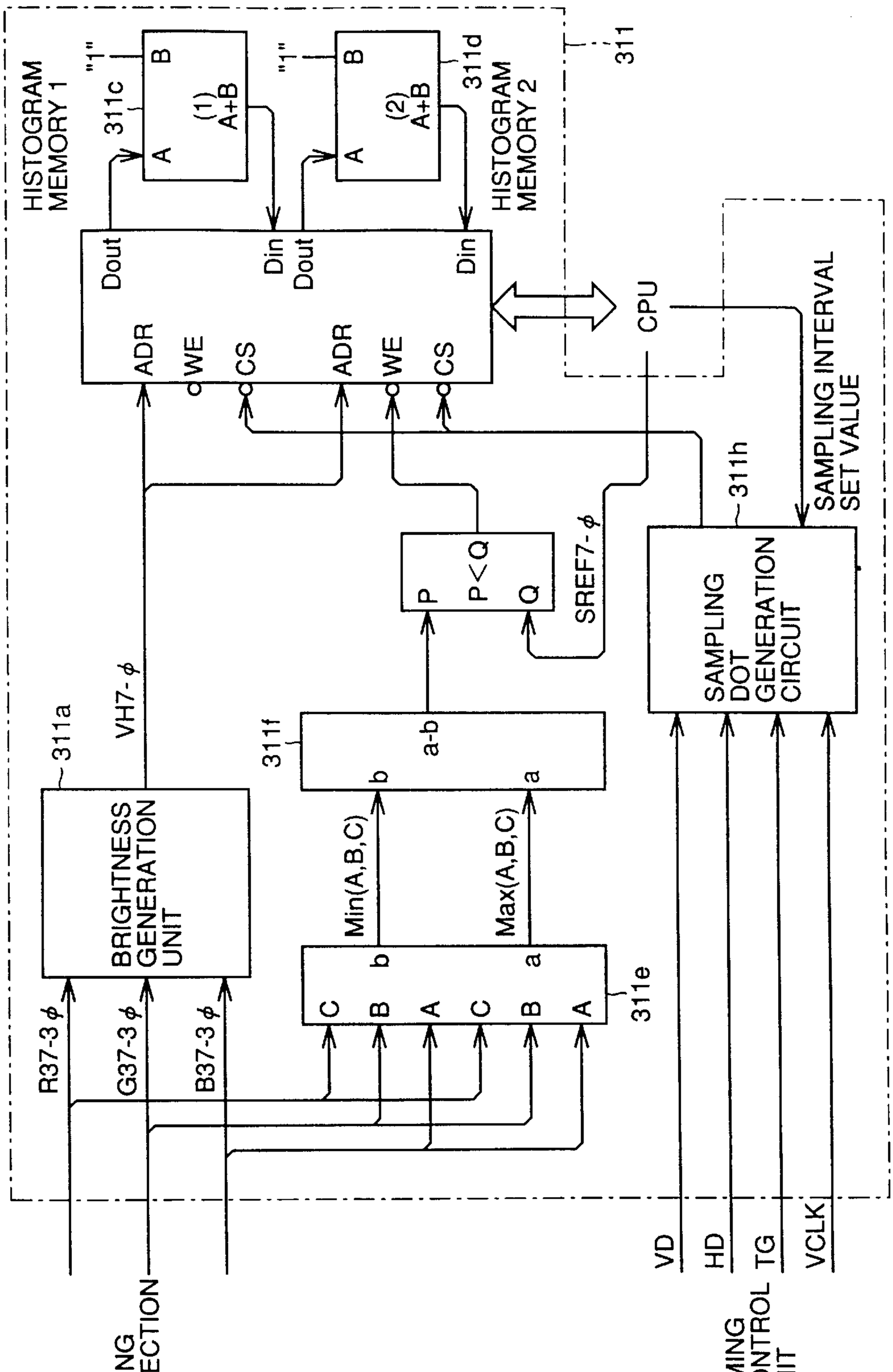

311
HISTOGRAM MEMORY 1
HISTOGRAM MEMORY 2
"1"
311c
311d
A
B
(1) A+B
(2) A+B
Dout
Din
ADR
WE
CS
CPU
SAMPLING INTERVAL SET VALUE
311h
SAMPLING DOT GENERATION CIRCUIT
P
P<Q
Q
SREF7-φ
VH7-φ
311a
311f
a-b
Min(A,B,C)
Max(A,B,C)
BRIGHTNESS GENERATION UNIT
R37-3φ
G37-3φ
B37-3φ
311e
C
B
A
VD
HD
TG
VCLK
SHADING CORRECTION UNIT
TIMING CONTROL UNIT

FIG.3

FIG.4

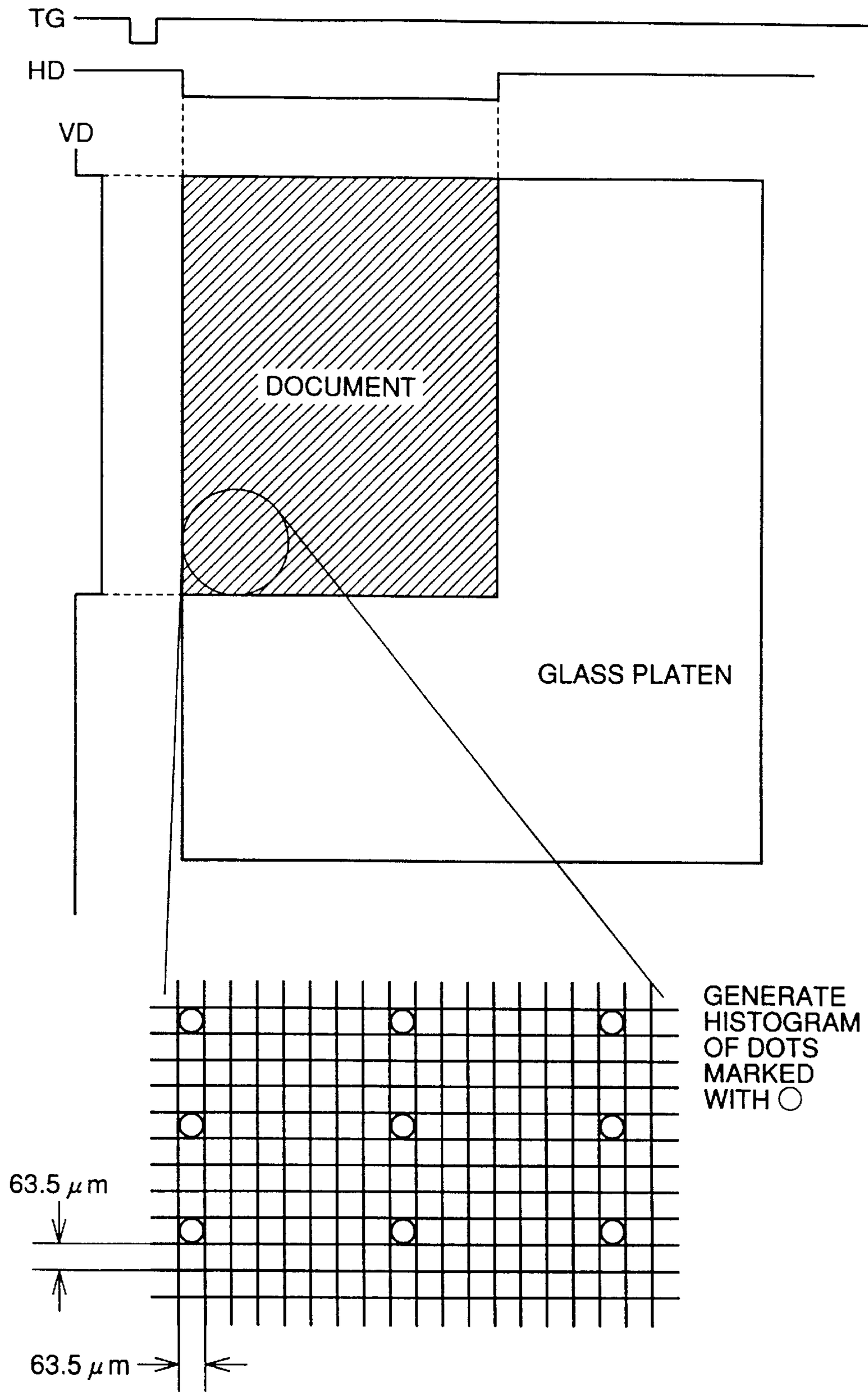
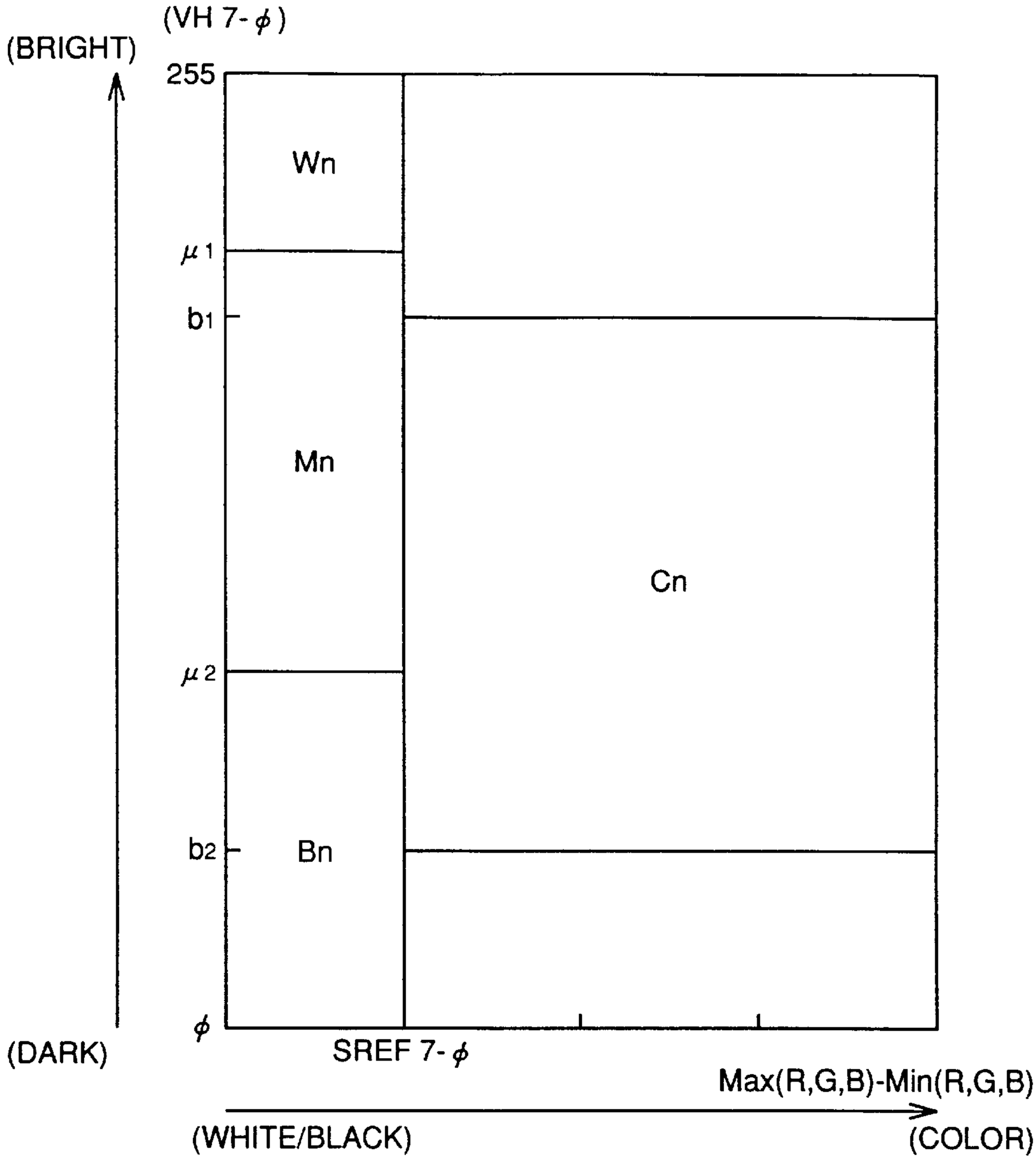

TG
HD
VD
DOCUMENT
GLASS PLATEN
GENERATE HISTOGRAM OF DOTS MARKED WITH ○
63.5 μm
63.5 μm

FIG.5



$$Wn=\sum_{n=\mu 1}^{255} \cdot h1(n) \qquad Sn=\sum_{n=\phi}^{255} \cdot h1(n)$$

$$Bn=\sum_{n=\phi}^{\mu 2} \cdot h1(n)$$

$$h3(n)=h1(n)-h2(n)$$

$$Cn=\sum_{n=b2}^{b1} \cdot h3(n)$$

(*) h1(n): INFORMATION OF HISTOGRAM MEMORY 1
h2(n): INFORMATION OF HISTOGRAM MEMORY 2

FIG.6

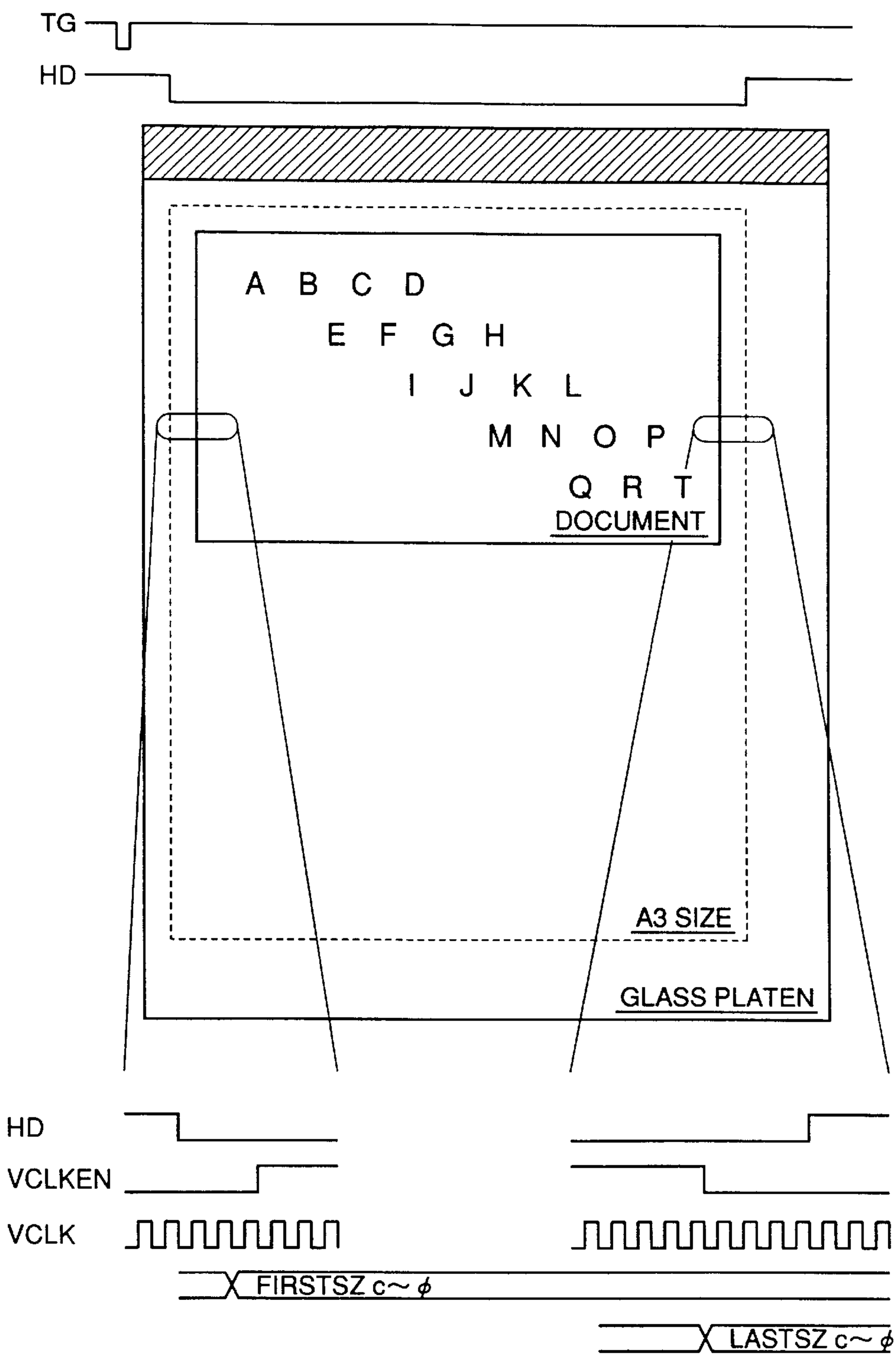

TG
HD
A B C D
E F G H
I J K L
M N O P
Q R T
DOCUMENT
A3 SIZE
GLASS PLATEN
HD
VCLKEN
VCLK
FIRSTSZ c~ ϕ
LASTSZ c~ ϕ

FIG.7A

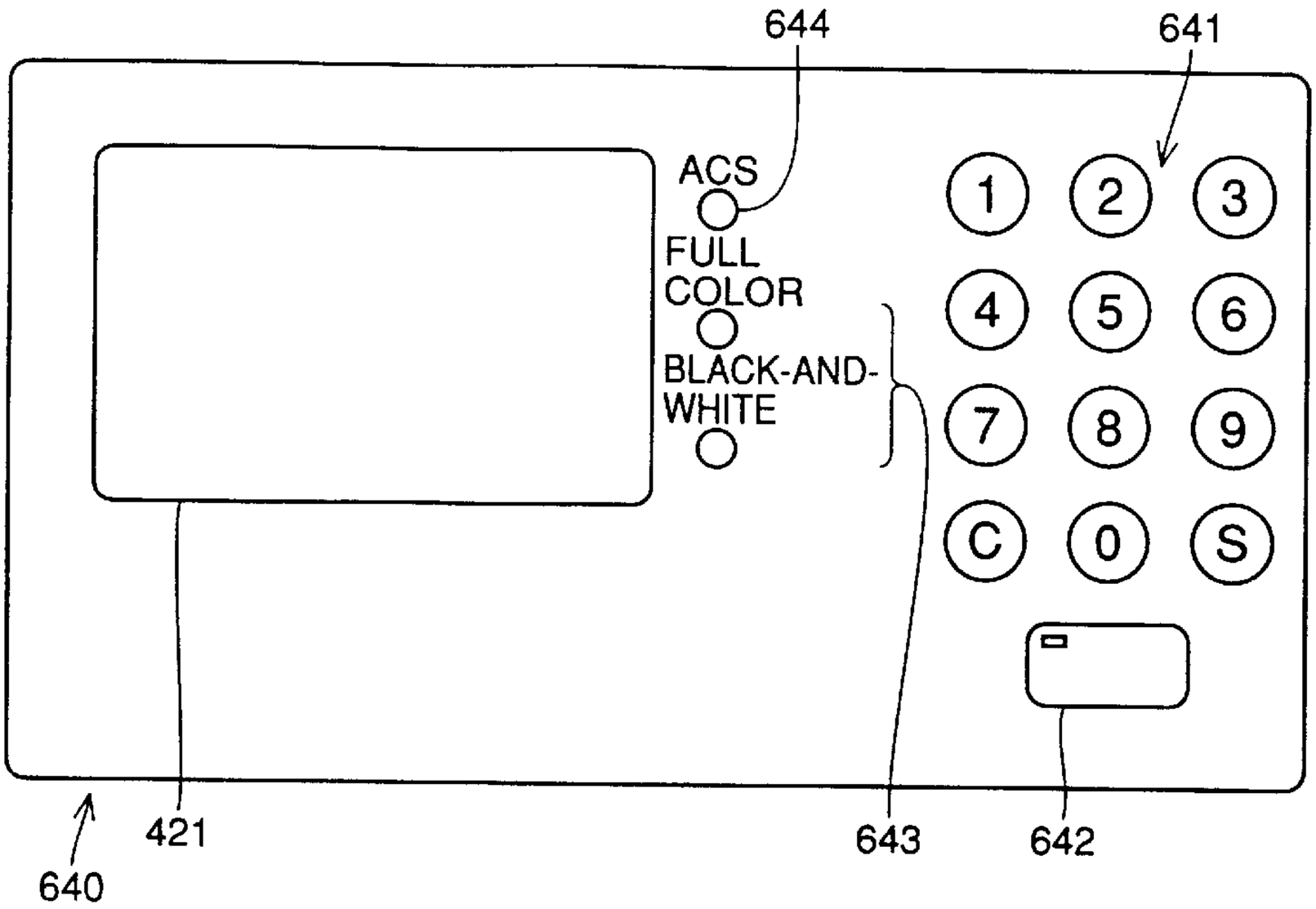

644
641
ACS
FULL COLOR
BLACK-AND-WHITE
1
2
3
4
5
6
7
8
9
C
0
S
421
643
642
640

FIG.7B

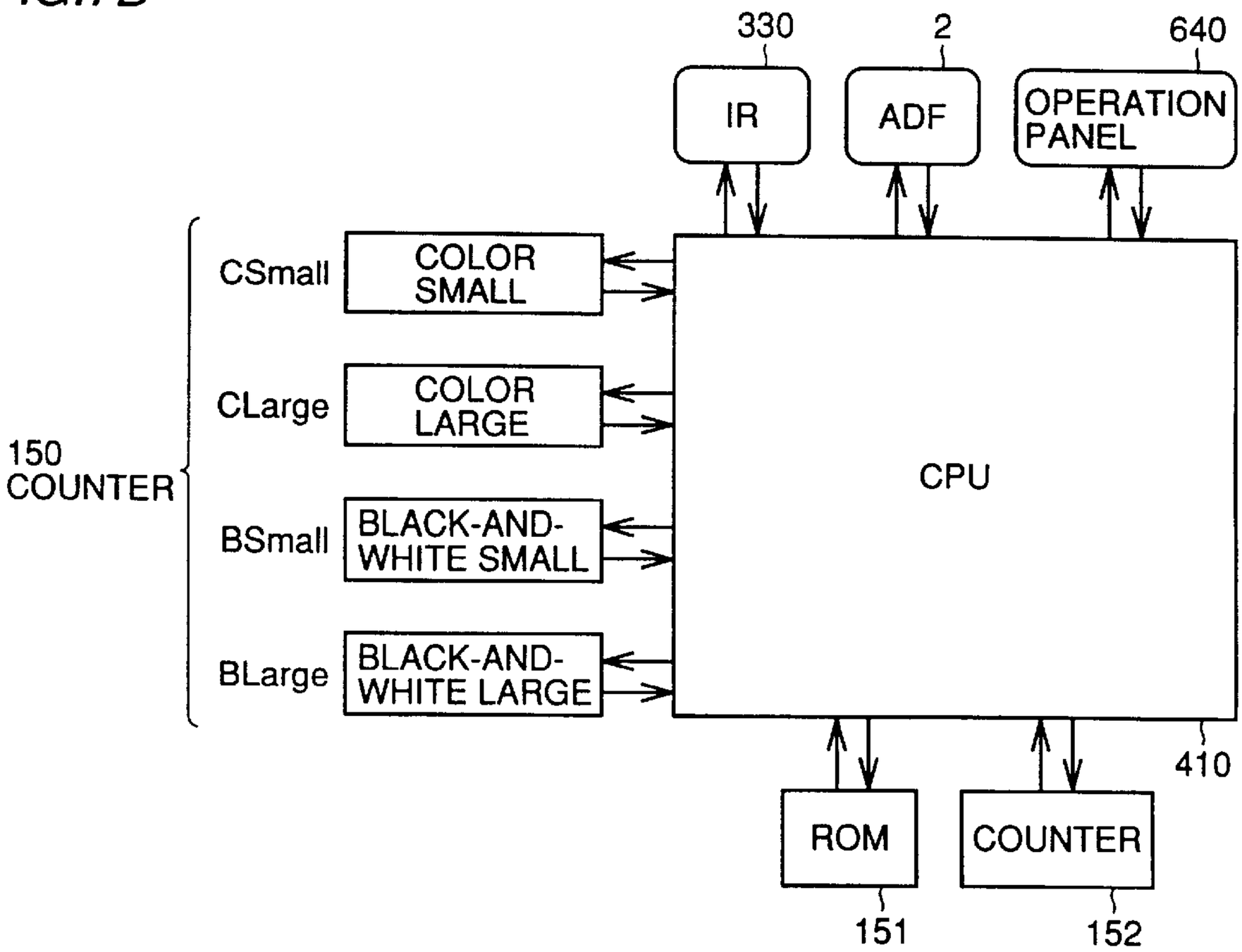

330
2
640
IR
ADF
OPERATION PANEL
150 COUNTER
CSmall
COLOR SMALL
CLarge
COLOR LARGE
BSmall
BLACK-AND-WHITE SMALL
BLarge
BLACK-AND-WHITE LARGE
CPU
410
ROM
COUNTER
151
152

FIG.8A

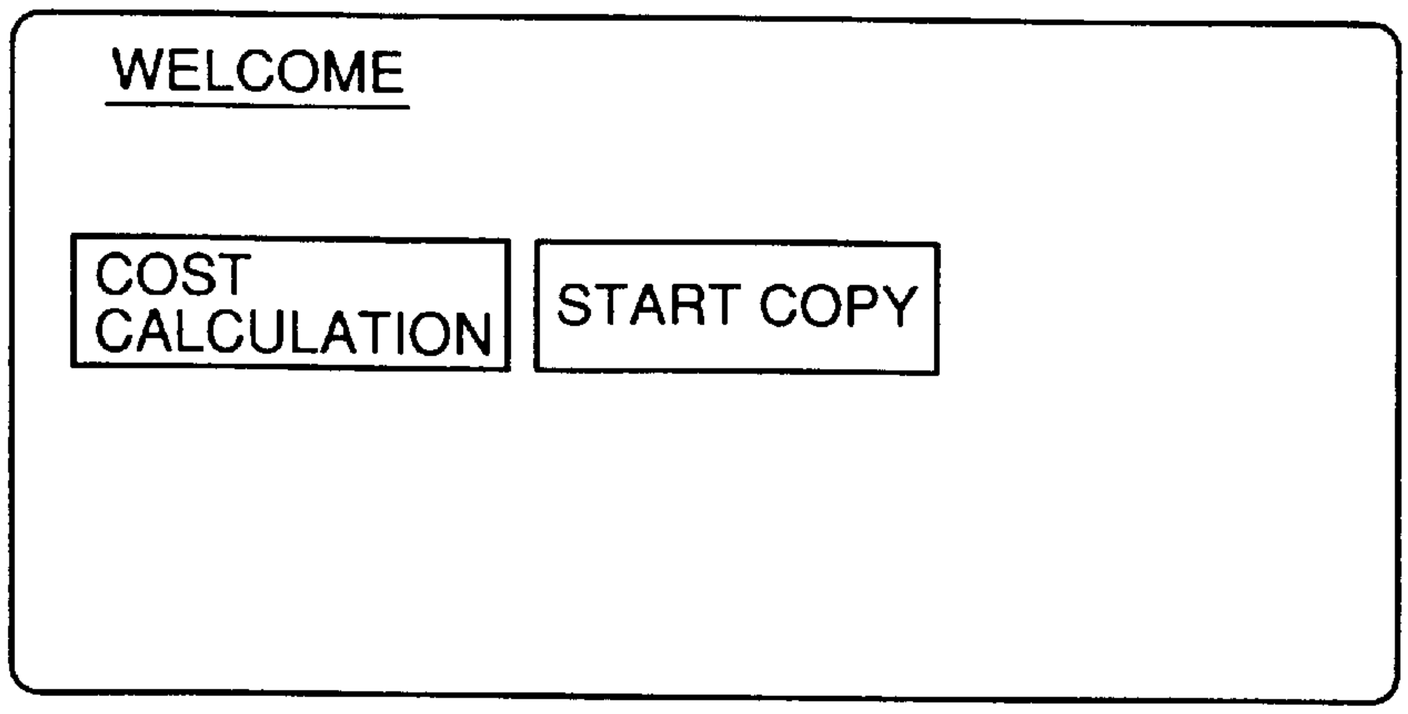


FIG.8B

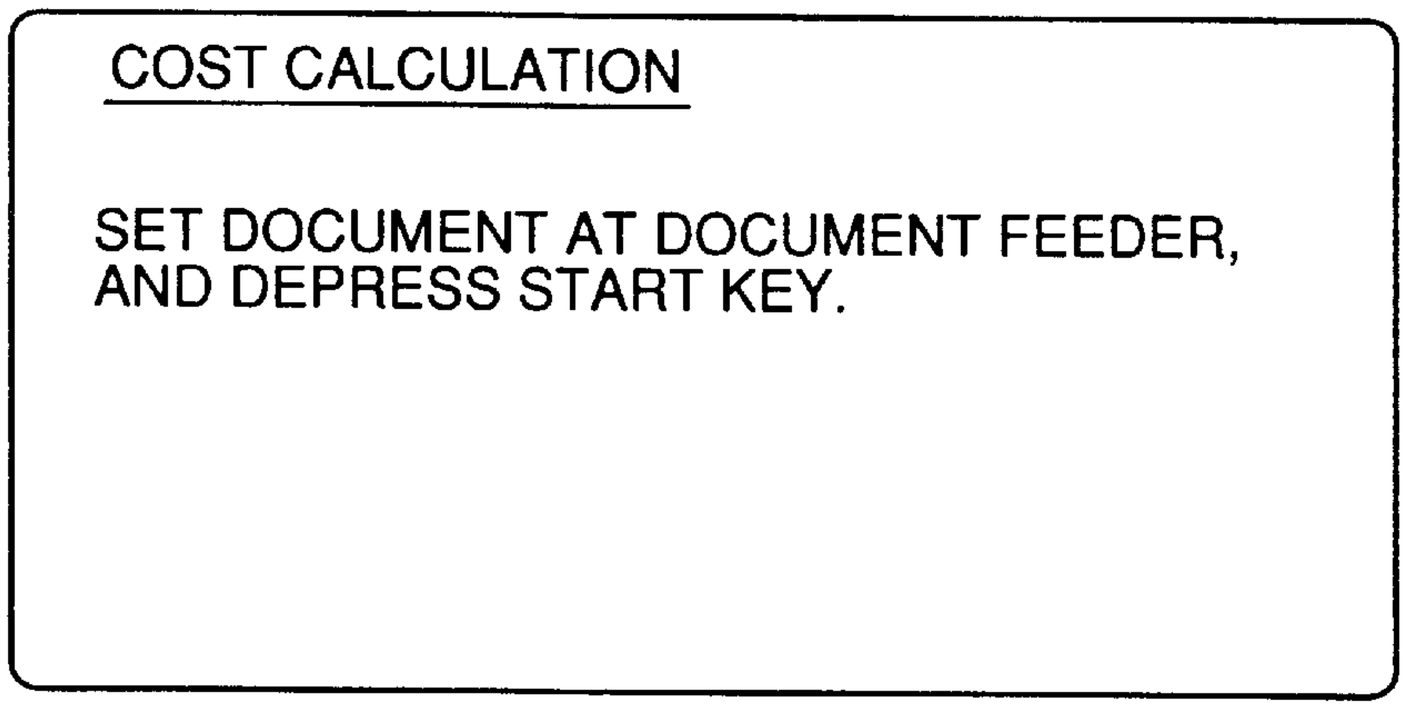


FIG.8C

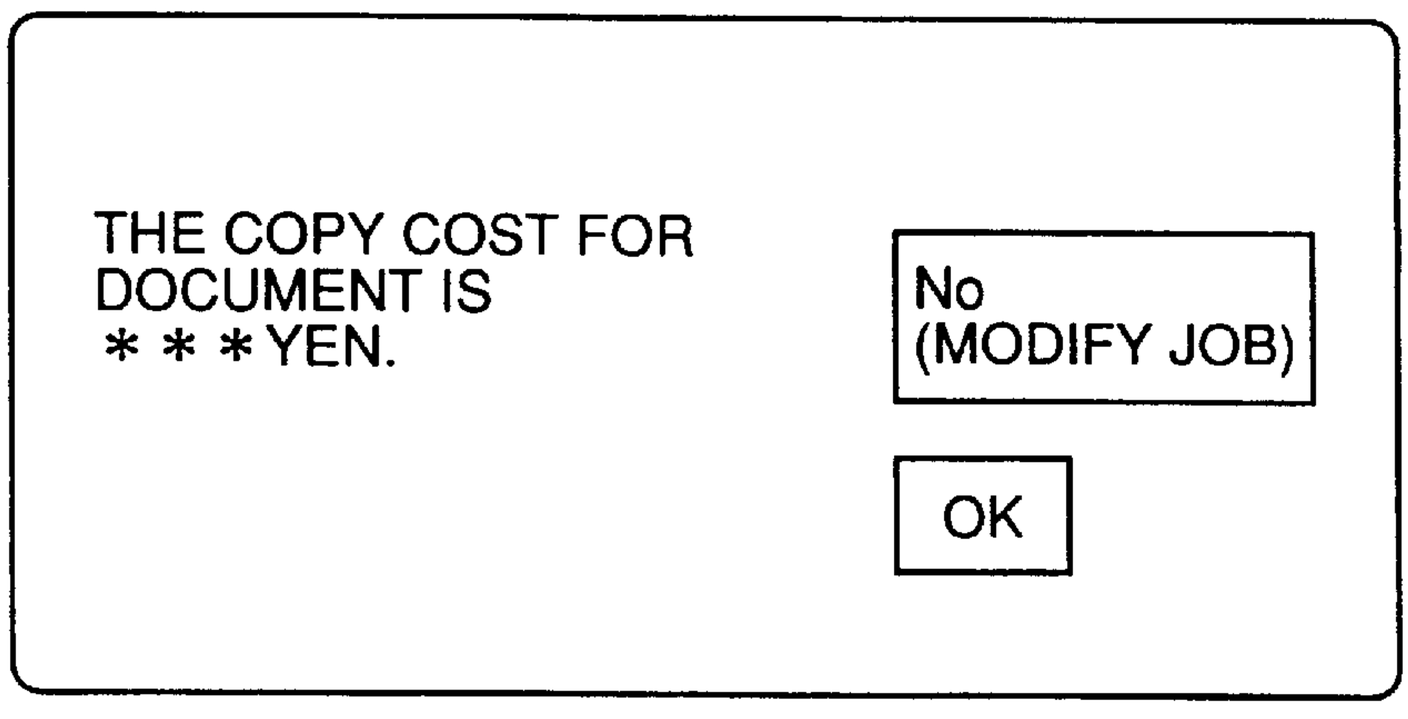
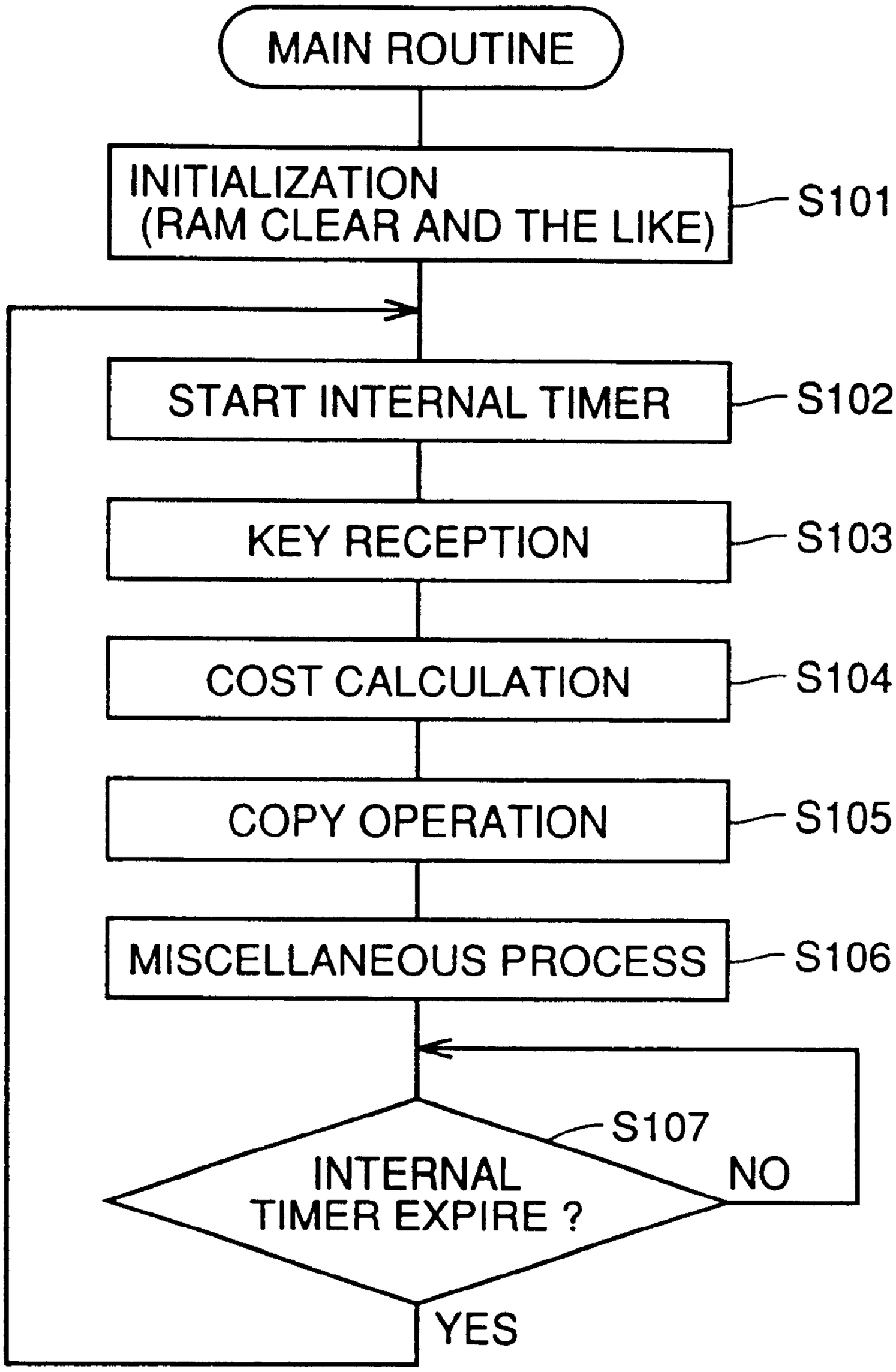


FIG.9


MAIN ROUTINE
INITIALIZATION (RAM CLEAR AND THE LIKE)
S101
START INTERNAL TIMER
S102
KEY RECEPTION
S103
COST CALCULATION
S104
COPY OPERATION
S105
MISCELLANEOUS PROCESS
S106
S107
INTERNAL TIMER EXPIRE ?
NO
YES

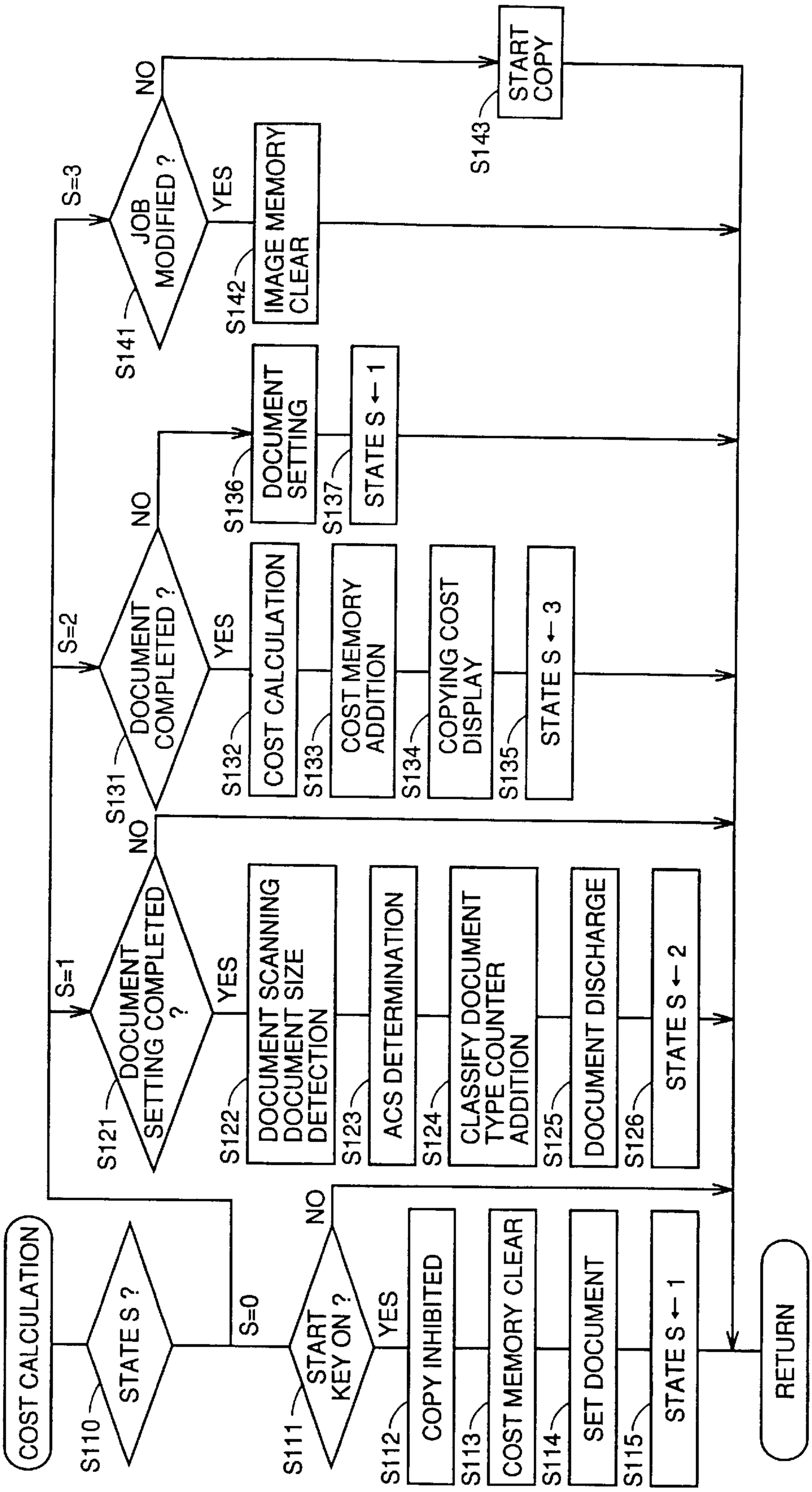

COST CALCULATION
S110
STATE S ?
S=0
S111
START KEY ON ?
NO
YES
S112
COPY INHIBITED
S113
COST MEMORY CLEAR
S114
SET DOCUMENT
S115
STATE S ← 1
RETURN
S=1
S121
DOCUMENT SETTING COMPLETED ?
NO
YES
S122
DOCUMENT SCANNING DOCUMENT SIZE DETECTION
S123
ACS DETERMINATION
S124
CLASSIFY DOCUMENT TYPE COUNTER ADDITION
S125
DOCUMENT DISCHARGE
S126
STATE S ← 2
S=2
S131
DOCUMENT COMPLETED ?
NO
YES
S132
COST CALCULATION
S133
COST MEMORY ADDITION
S134
COPYING COST DISPLAY
S135
STATE S ← 3
S=3
S141
JOB MODIFIED ?
NO
YES
S142
IMAGE MEMORY CLEAR
S143
START COPY

FIG.10

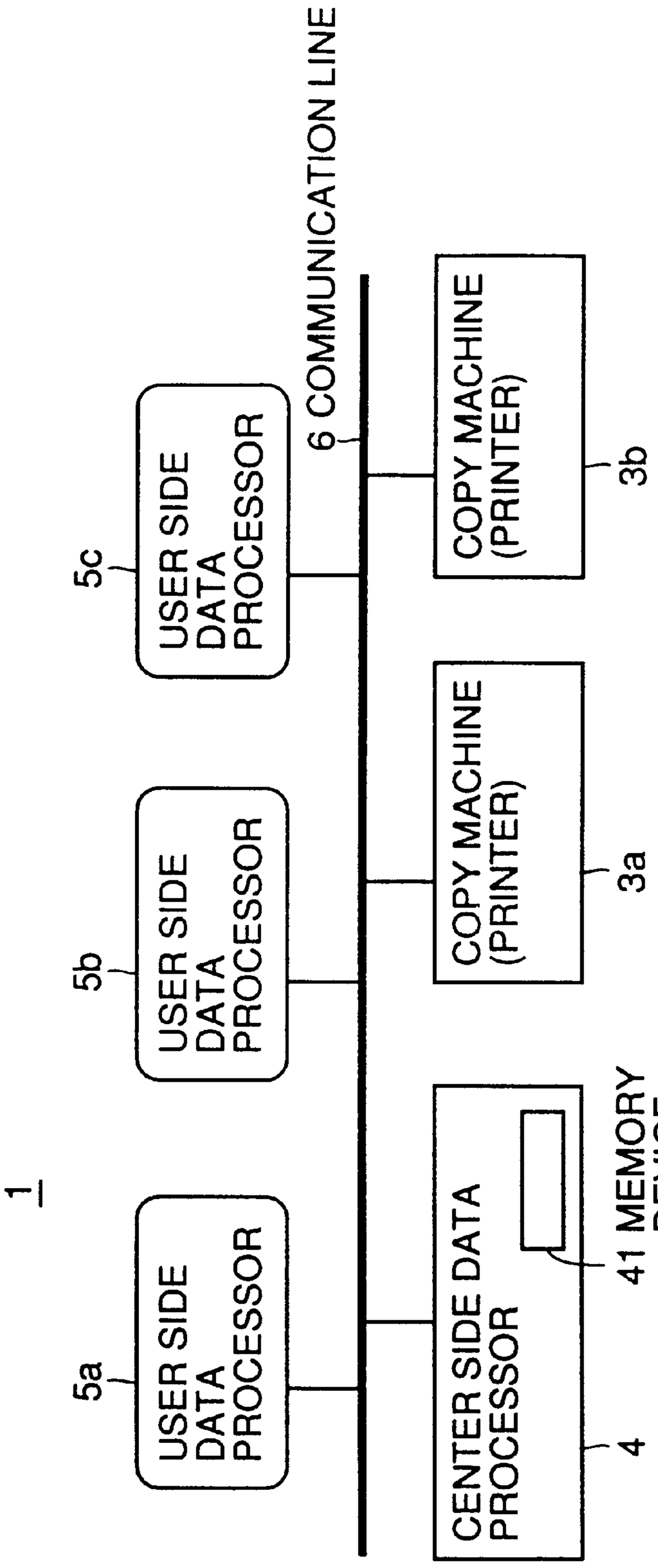

1
5a
USER SIDE DATA PROCESSOR
5b
USER SIDE DATA PROCESSOR
5c
USER SIDE DATA PROCESSOR
6 COMMUNICATION LINE
4
CENTER SIDE DATA PROCESSOR
41 MEMORY DEVICE
3a
COPY MACHINE (PRINTER)
3b
COPY MACHINE (PRINTER)

FIG.11

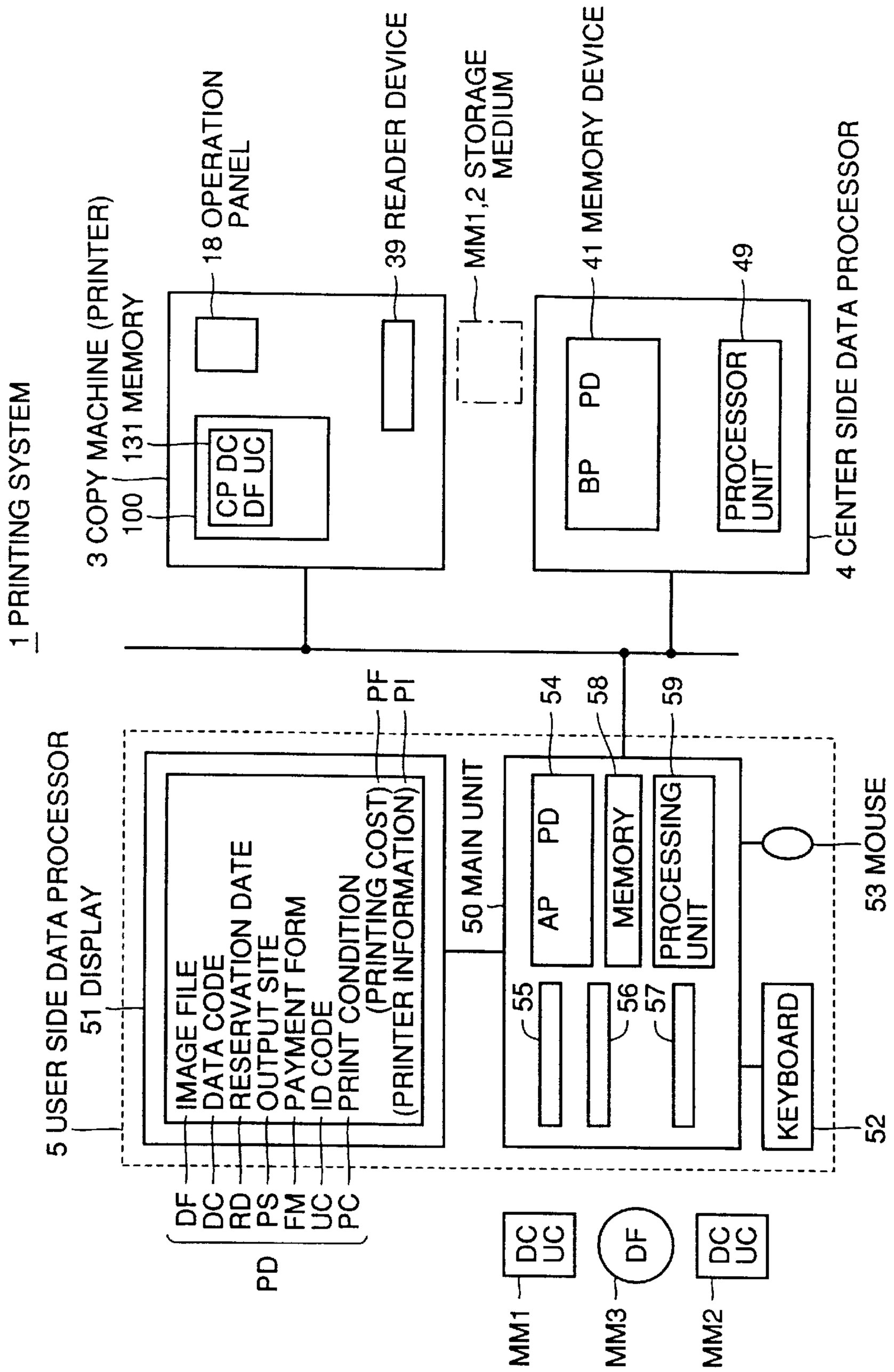

1 PRINTING SYSTEM
3 COPY MACHINE (PRINTER)
100
131 MEMORY
CP DC
DF UC
18 OPERATION PANEL
39 READER DEVICE
MM1,2 STORAGE MEDIUM
41 MEMORY DEVICE
BP PD
49
PROCESSOR UNIT
4 CENTER SIDE DATA PROCESSOR
PF
PI
54
58
59
5 USER SIDE DATA PROCESSOR
51 DISPLAY
IMAGE FILE
DATA CODE
RESERVATION DATE
OUTPUT SITE
PAYMENT FORM
ID CODE
PRINT CONDITION
(PRINTING COST)
(PRINTER INFORMATION)
50 MAIN UNIT
AP PD
MEMORY
PROCESSING UNIT
53 MOUSE
55
56
57
KEYBOARD
52
DF
DC
RD
PS
FM
UC
PC
PD
MM1
DC
UC
MM3
DF
MM2
DC
UC

FIG.12

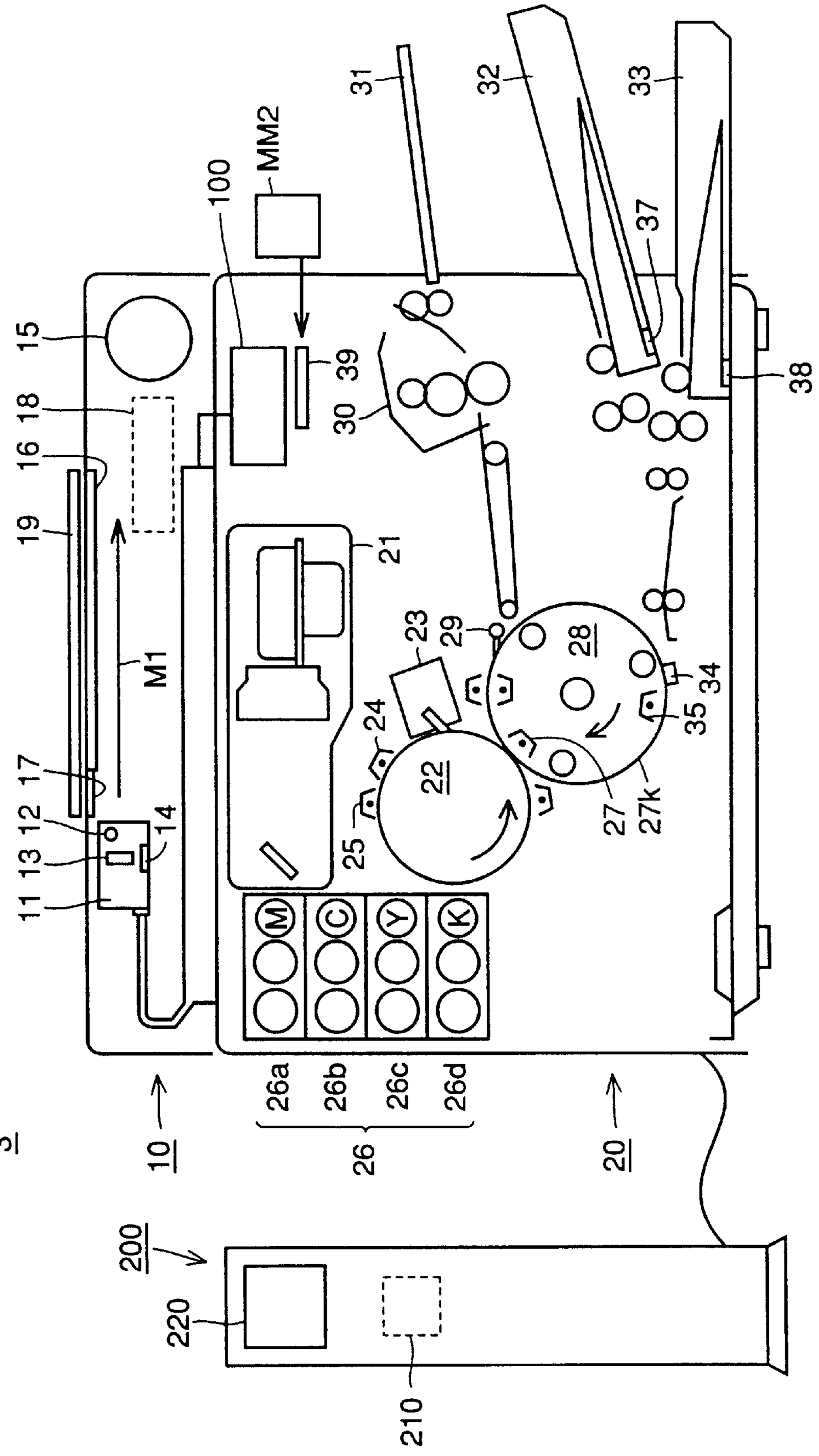

31
32
33
MM2
100
37
38
15
39
30
18
16
19
21
M1
23
29
28
24
34
35
22
25
27
27k
17
12
13
14
11
M
C
Y
K
26a
26b
26c
26d
26
10
20
3
200
220
210

FIG. 13

FIG.14

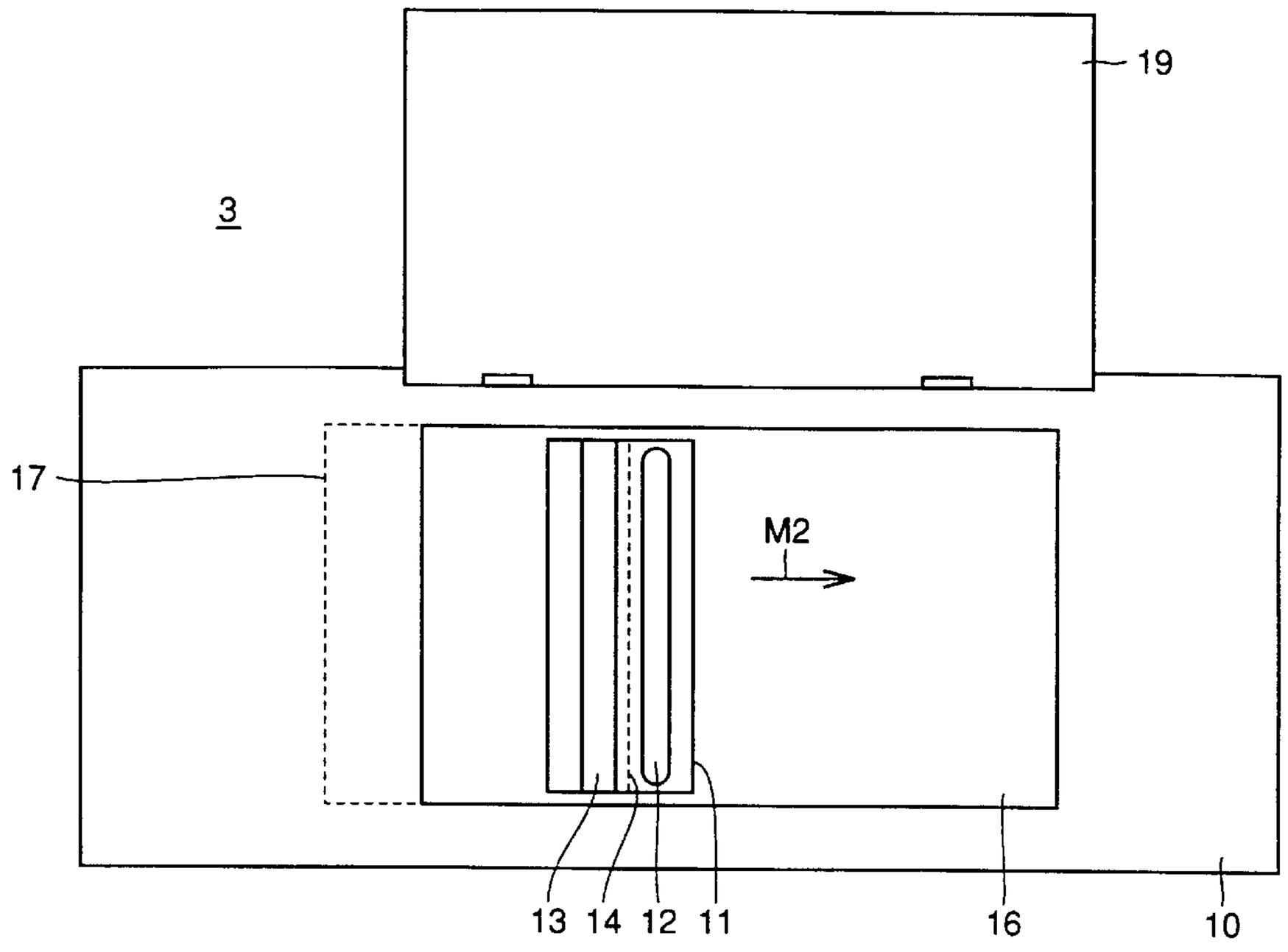

3
19
17
M2
13
14
12
11
16
10

FIG.15

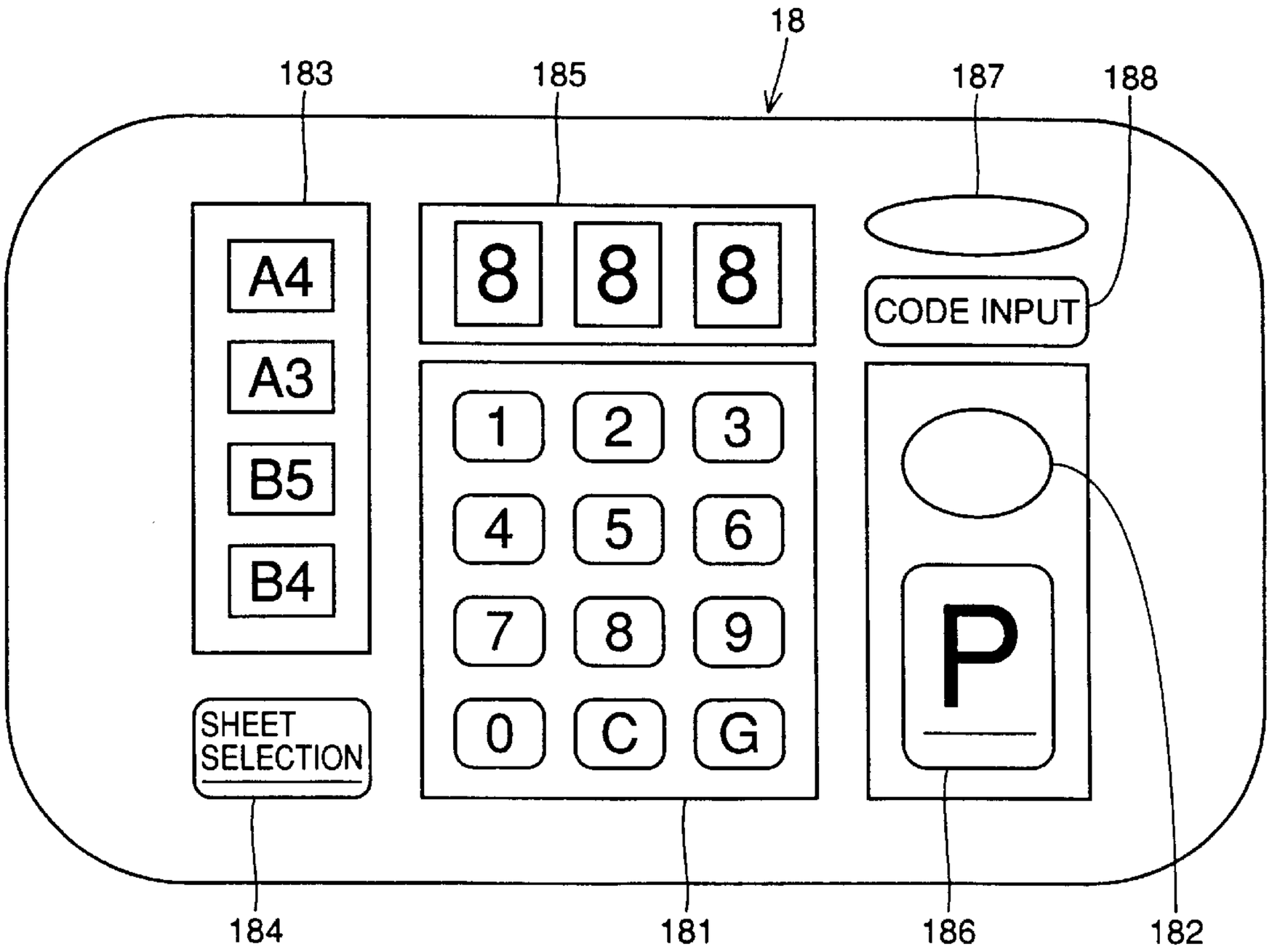

18
183
185
187
188
A4
A3
B5
B4
8 8 8
CODE INPUT
1 2 3
4 5 6
7 8 9
0 C G
P
SHEET SELECTION
184
181
186
182

FIG.16

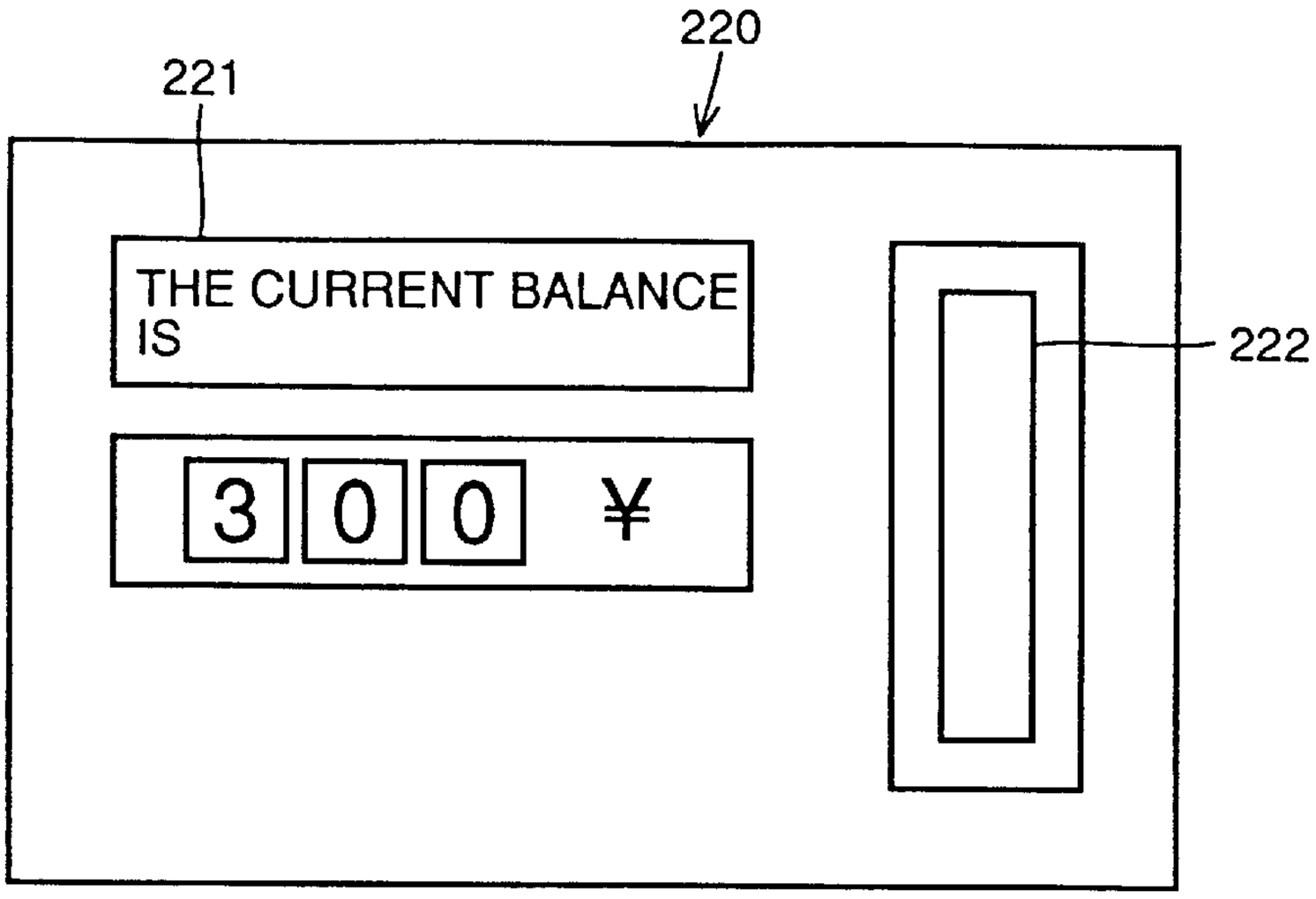

220
221
THE CURRENT BALANCE IS
3 0 0 ¥
222

FIG.17

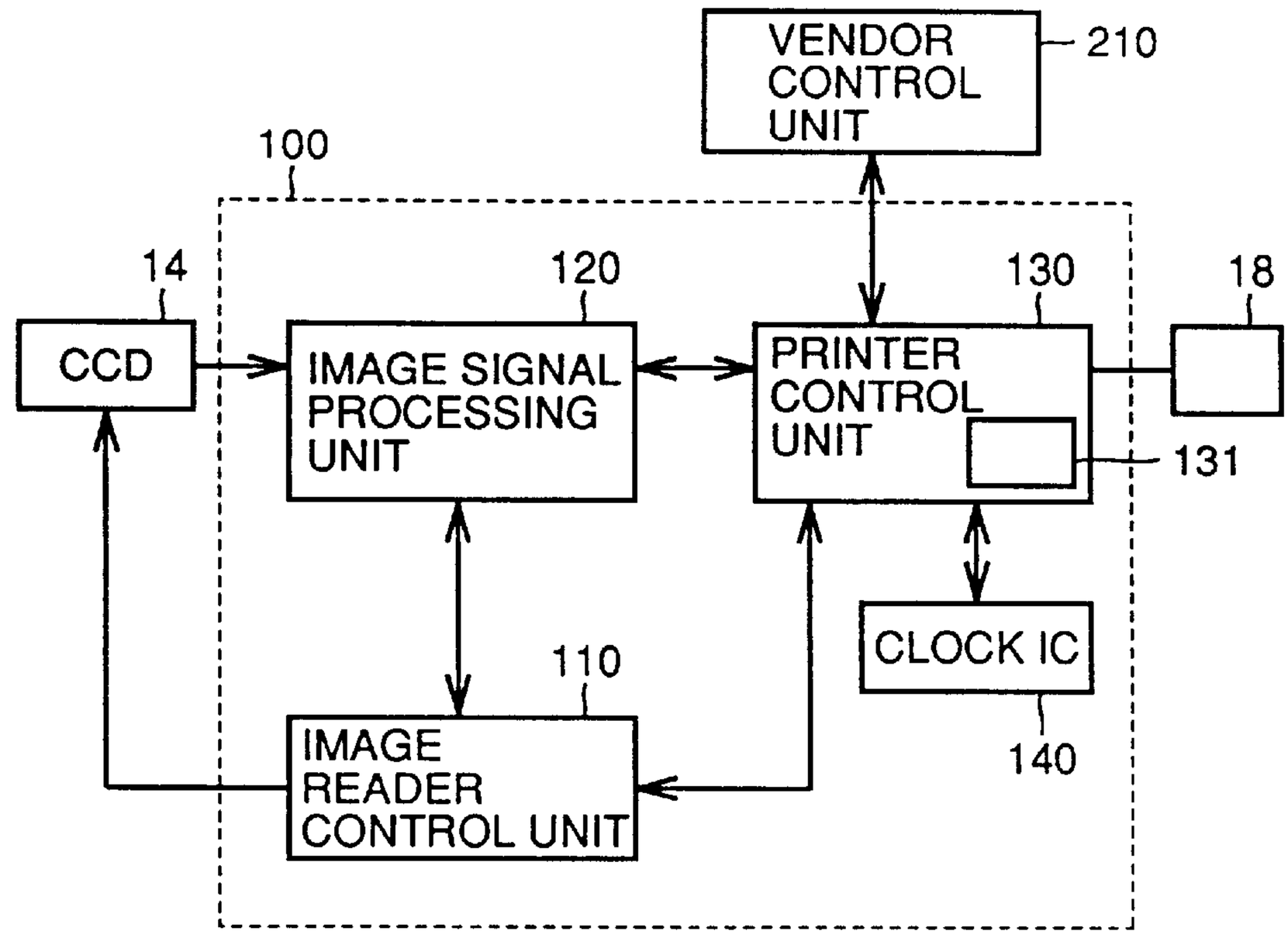

VENDOR CONTROL UNIT
210
100
14
120
130
18
CCD
IMAGE SIGNAL PROCESSING UNIT
PRINTER CONTROL UNIT
131
CLOCK IC
140
110
IMAGE READER CONTROL UNIT

FIG.18

PD1

NN	DC	JT	ST	RD	FM	
NO	DATA CODE	DATE OF RECEPTION	DATE OF TRANSMISSION	RESERVATION DATE	PAYMENT FORM	

DF	RI	ET	UC	PC
IMAGE FILE	RESERVATION DESIGNATED/NOT DESIGNATED	TIME UNTIL ERASURE	ID CODE	PRINT CONDITION

FIG.19

No	DF IMAGE FILE	DC DATA CODE	UC ID CODE	PC PRINT CONDITION
1	A	111	1234	a
	B	222		b
	C	333		c
2	D	444	1235	d
3	E	555	1236	e
	F	666		f
4	G	777	1237	
	H	888		

PATTERN	NUMBER OF PRINTS	OUTPUT COLOR	DUPLEX OUTPUT	STAPLE	PUNCH	SHEET SIZE	PICTURE QUALITY
a	1	MONOCHROMATIC	ONE-SIDE PRINTING	DESIGNATED	DESIGNATED	A4	AT LEAST 600 DPI
b	3	COLOR	ONE-SIDE PRINTING	NOT DESIGNATED	NOT DESIGNATED	A3	AT LEAST 400 DPI
c	2	COLOR	ONE-SIDE PRINTING	NOT DESIGNATED	NOT DESIGNATED	B5	AT LEAST 400 DPI
d	6	MONOCHROMATIC	ONE-SIDE PRINTING	NOT DESIGNATED	NOT DESIGNATED	A4	NOT DESIGNATED
e	5	MONOCHROMATIC	TWO-SIDE PRINTING	NOT DESIGNATED	NOT DESIGNATED	A4	NOT DESIGNATED
f	1	MONOCHROMATIC	TWO-SIDE PRINTING	DESIGNATED	DESIGNATED	B4	AT LEAST 600 DPI
•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•
•	•	•	•	•	•	•	•

FIG.20

FIG.21

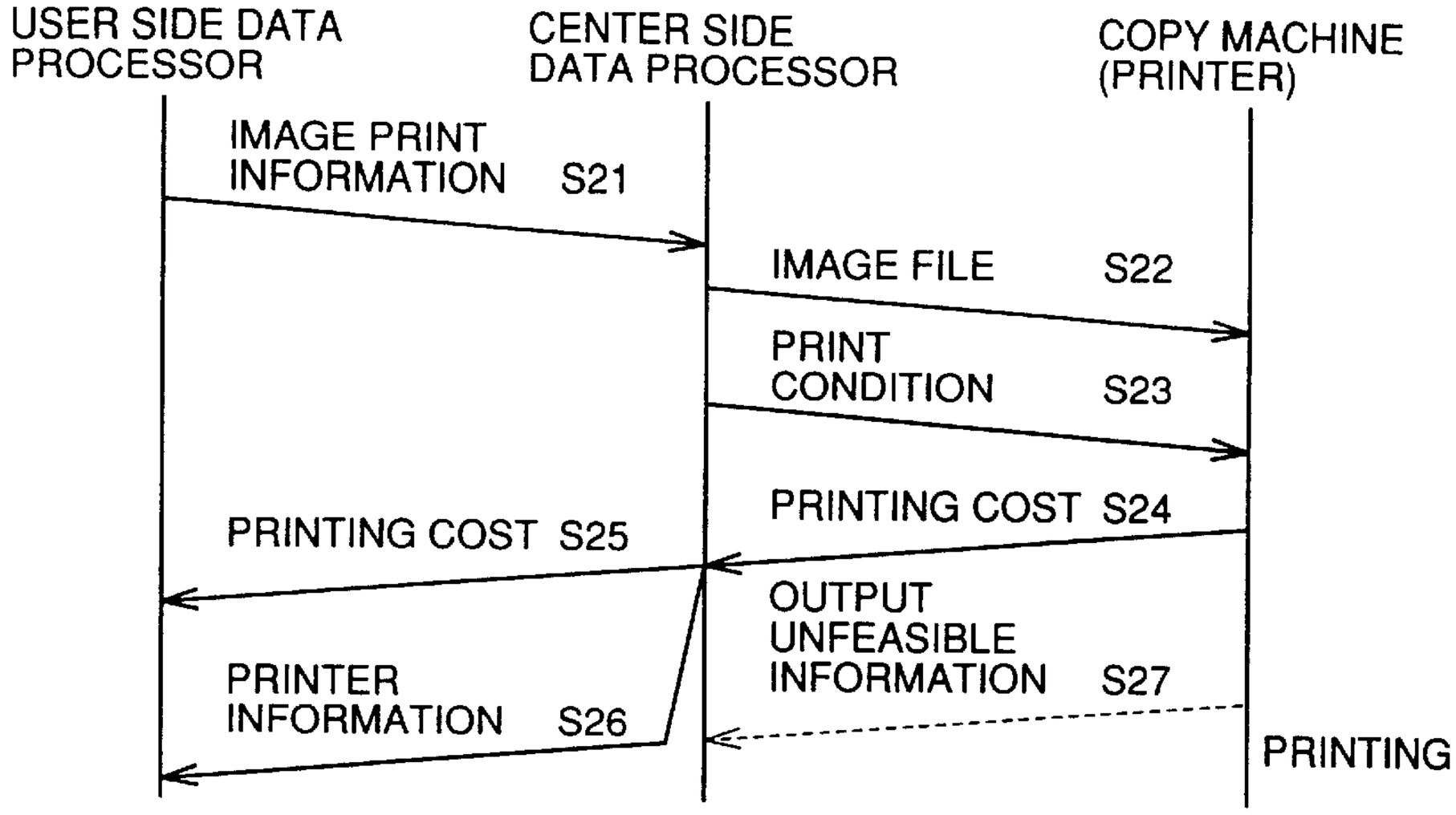

USER SIDE DATA PROCESSOR
CENTER SIDE DATA PROCESSOR
COPY MACHINE (PRINTER)
IMAGE PRINT INFORMATION S21
IMAGE FILE S22
PRINT CONDITION S23
PRINTING COST S24
PRINTING COST S25
OUTPUT UNFEASIBLE INFORMATION S27
PRINTER INFORMATION S26
PRINTING

FIG.22

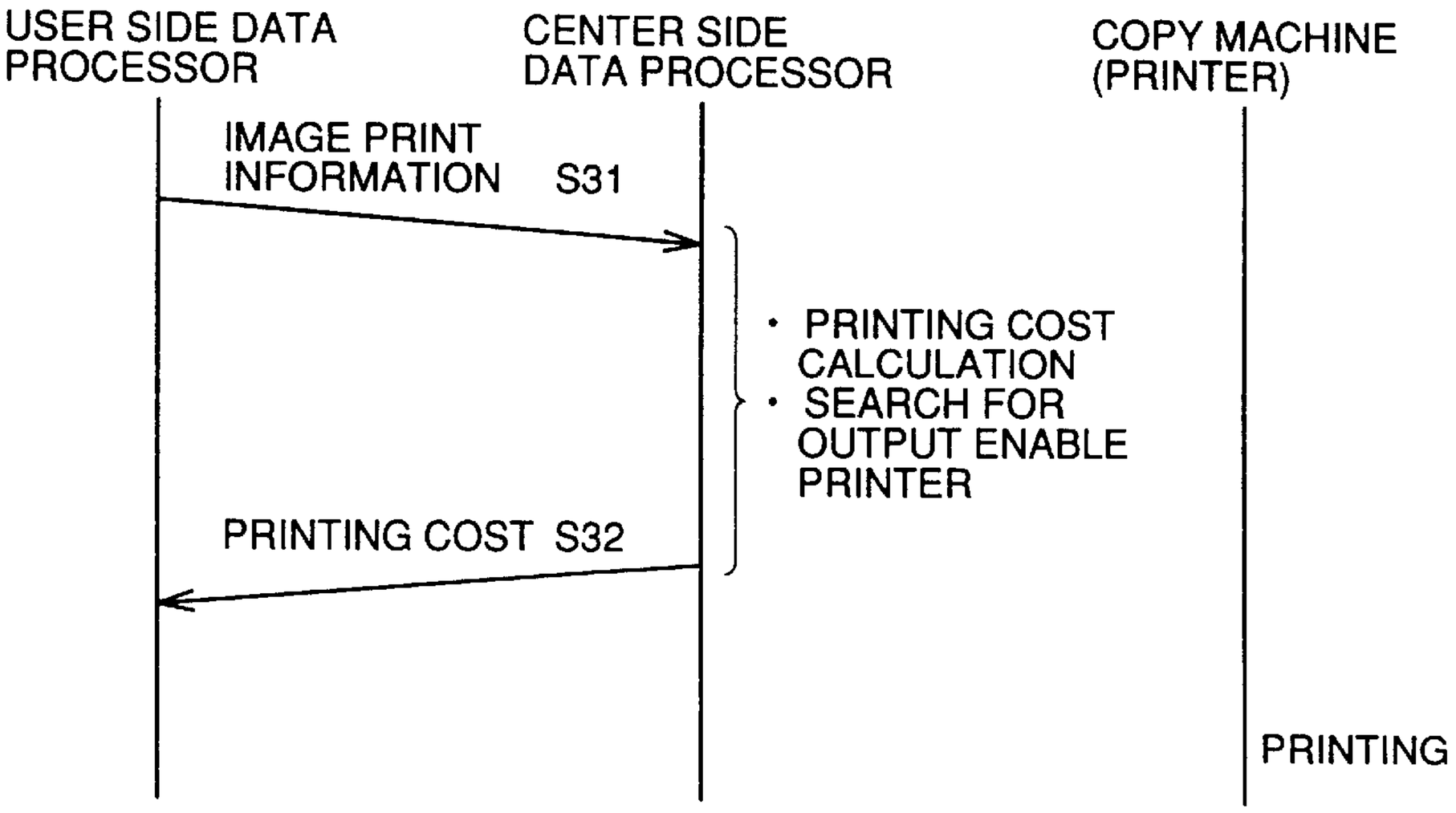

USER SIDE DATA PROCESSOR
CENTER SIDE DATA PROCESSOR
COPY MACHINE (PRINTER)
IMAGE PRINT INFORMATION S31
• PRINTING COST CALCULATION
• SEARCH FOR OUTPUT ENABLE PRINTER
PRINTING COST S32
PRINTING

FIG.23

MACHINE NAME	INSTALLED SITE	COLOR ACCOMMODATION	PICTURE QUALITY	SIZE OF INSTALLED SHEET	RANGE OF CORRESPONDING MAGNIFICATION	DUPLEX COPY ACCOMMODATION	OUTPUT SPEED
XXXXX	XXX	MONOCHROMATIC MACHINE	400DPI	A3・A4・B4	0.25～4.0	YES	10 SHEETS/MINUTE
YYYYY	YYY	COLOR MACHINE	400DPI	A4・B4	0.25～4.0	NO	3 SHEETS/MINUTE
ZZZZZ	ZZZ	MONOCHROMATIC MACHINE	600DPI	A4	0.25～4.0	NO	20 SHEETS/MINUTE
AAAAA	AAA	MONOCHROMATIC MACHINE	400DPI	A4・A4 (CARDBOARD)	0.5～2.0	NO	12 SHEETS/MINUTE
・	・	・	・	・	・	・	・
・	・	・	・	・	・	・	・

PUNCH	STAPLE	MONOCHROMATIC UNIT COST	COLOR UNIT COST	PRINTING COST
DESIGNATED	DESIGNATED	10 YEN	———	600 YEN
NOT DESIGNATED	NOT DESIGNATED	15 YEN	50 YEN	2000 YEN
NOT DESIGNATED	DESIGNATED	20 YEN	———	1200 YEN
NOT DESIGNATED	NOT DESIGNATED	8 YEN/30 YEN (CARDBOARD)	———	500 YEN
・	・	・	・	・
・	・	・	・	・

FIG.24

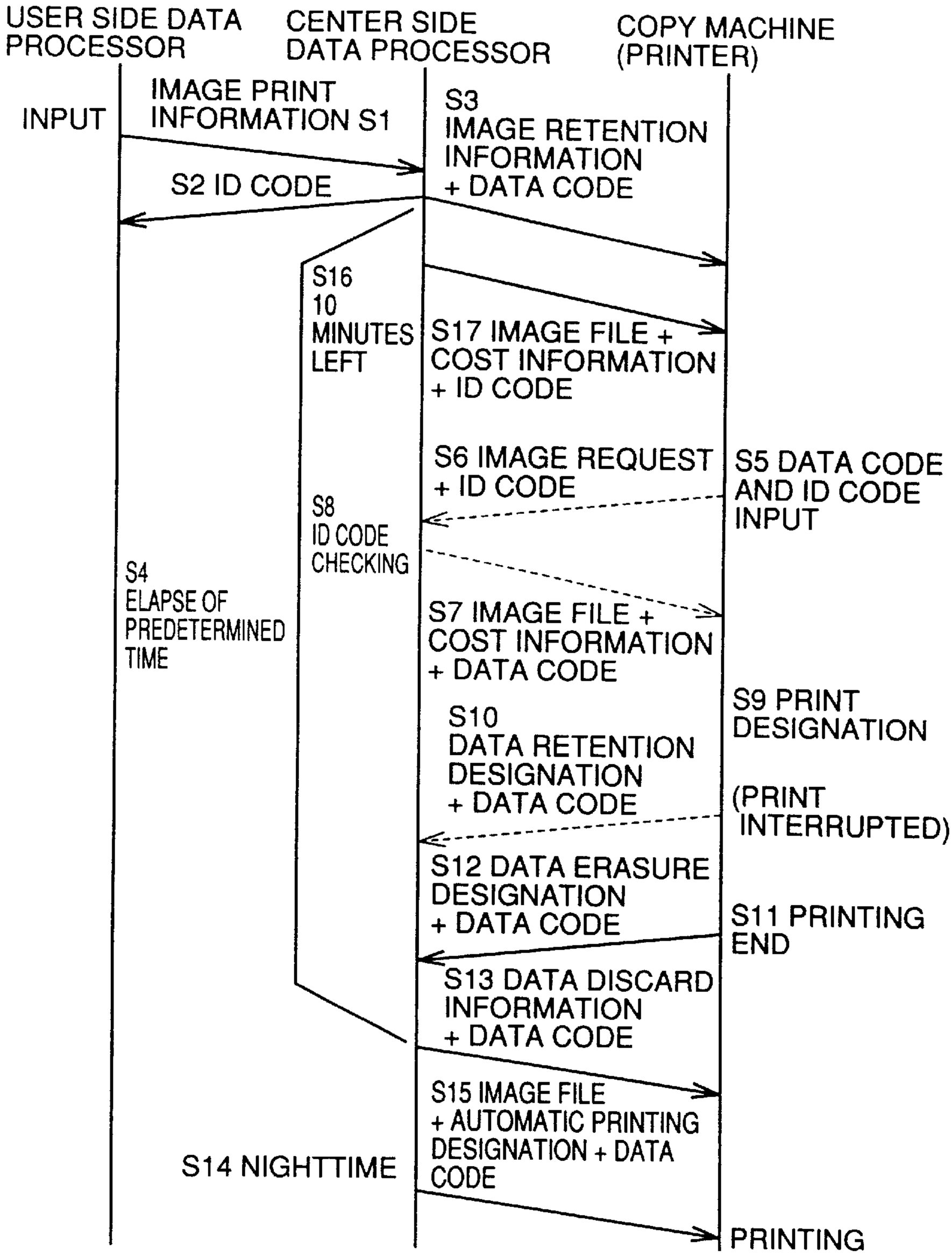

USER SIDE DATA PROCESSOR
CENTER SIDE DATA PROCESSOR
COPY MACHINE (PRINTER)
INPUT
IMAGE PRINT INFORMATION S1
S2 ID CODE
S3 IMAGE RETENTION INFORMATION + DATA CODE
S16 10 MINUTES LEFT
S17 IMAGE FILE + COST INFORMATION + ID CODE
S6 IMAGE REQUEST + ID CODE
S5 DATA CODE AND ID CODE INPUT
S8 ID CODE CHECKING
S4 ELAPSE OF PREDETERMINED TIME
S7 IMAGE FILE + COST INFORMATION + DATA CODE
S9 PRINT DESIGNATION
S10 DATA RETENTION DESIGNATION + DATA CODE
(PRINT INTERRUPTED)
S12 DATA ERASURE DESIGNATION + DATA CODE
S11 PRINTING END
S13 DATA DISCARD INFORMATION + DATA CODE
S15 IMAGE FILE + AUTOMATIC PRINTING DESIGNATION + DATA CODE
S14 NIGHTTIME
PRINTING

FIG.25

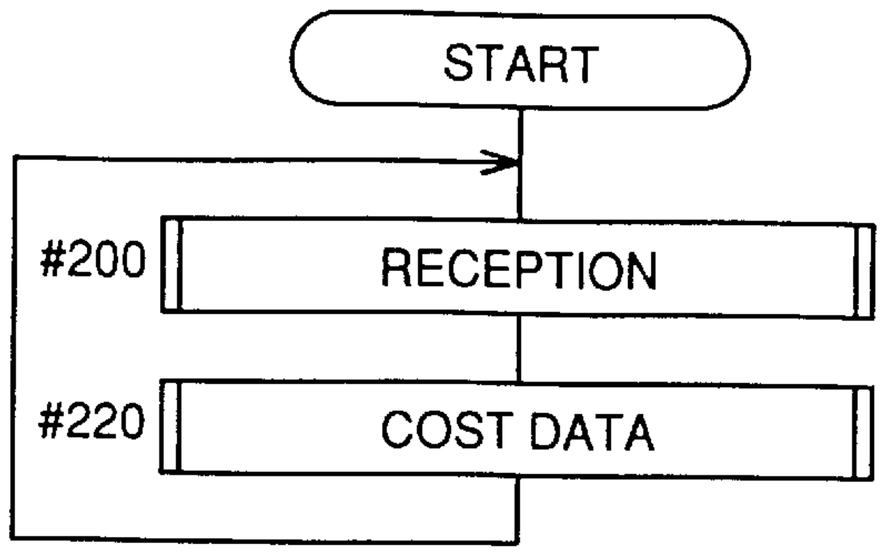

START
#200
RECEPTION
#220
COST DATA

FIG.26

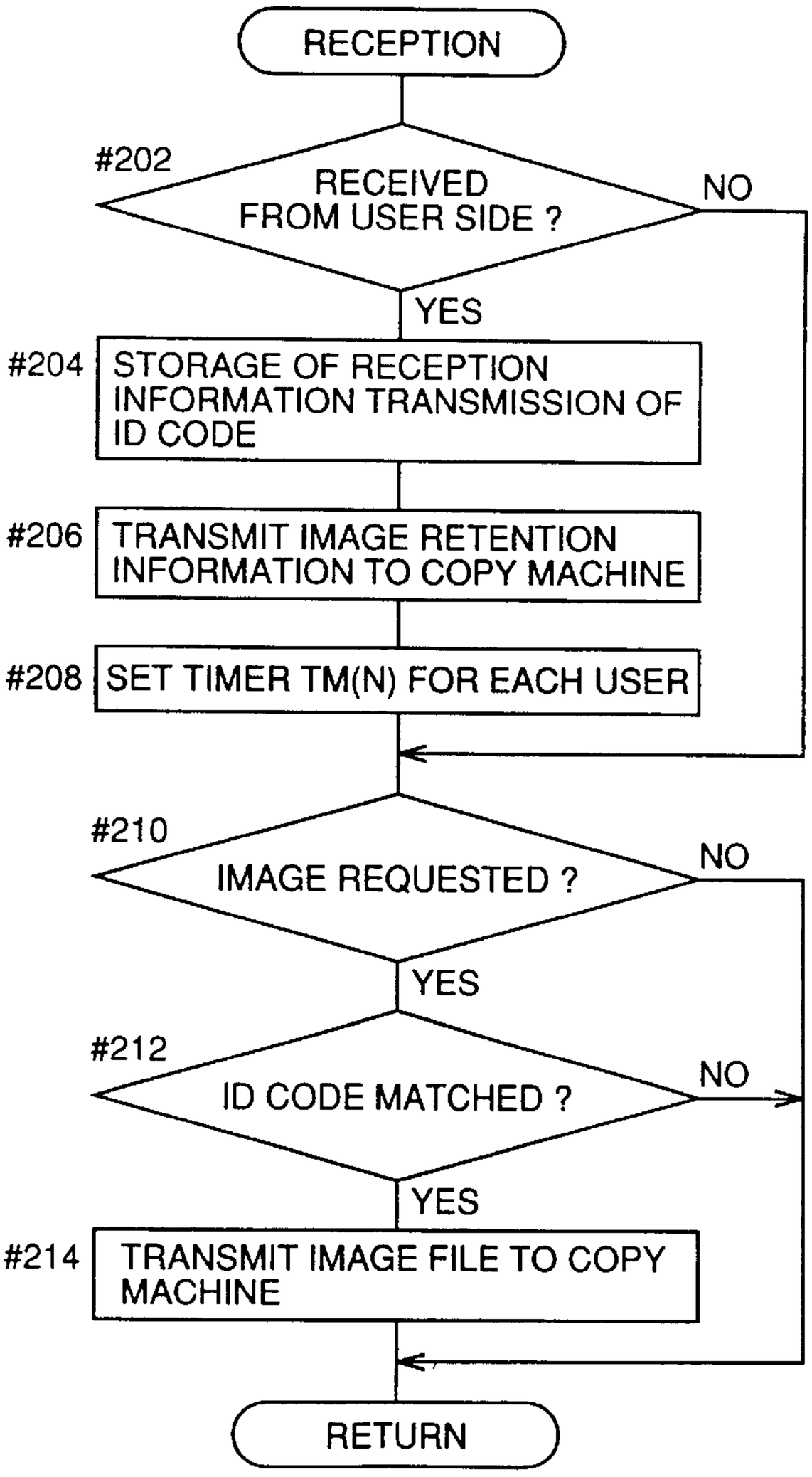

RECEPTION
#202
RECEIVED FROM USER SIDE ?
NO
YES
#204
STORAGE OF RECEPTION INFORMATION TRANSMISSION OF ID CODE
#206
TRANSMIT IMAGE RETENTION INFORMATION TO COPY MACHINE
#208
SET TIMER TM(N) FOR EACH USER
#210
IMAGE REQUESTED ?
NO
YES
#212
ID CODE MATCHED ?
NO
YES
#214
TRANSMIT IMAGE FILE TO COPY MACHINE
RETURN

FIG.27

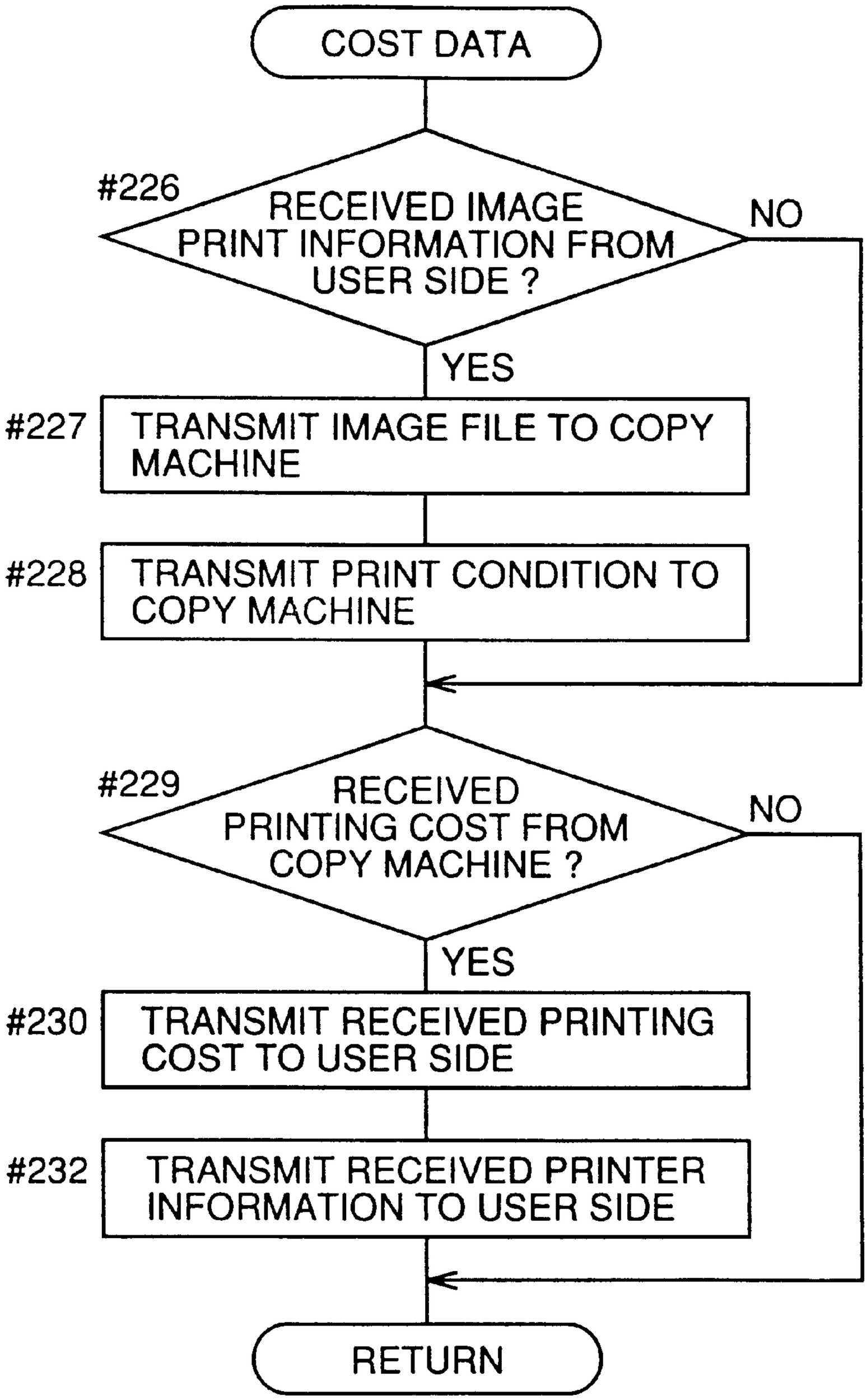

COST DATA
#226
RECEIVED IMAGE PRINT INFORMATION FROM USER SIDE ?
NO
YES
#227
TRANSMIT IMAGE FILE TO COPY MACHINE
#228
TRANSMIT PRINT CONDITION TO COPY MACHINE
#229
RECEIVED PRINTING COST FROM COPY MACHINE ?
NO
YES
#230
TRANSMIT RECEIVED PRINTING COST TO USER SIDE
#232
TRANSMIT RECEIVED PRINTER INFORMATION TO USER SIDE
RETURN

FIG.28

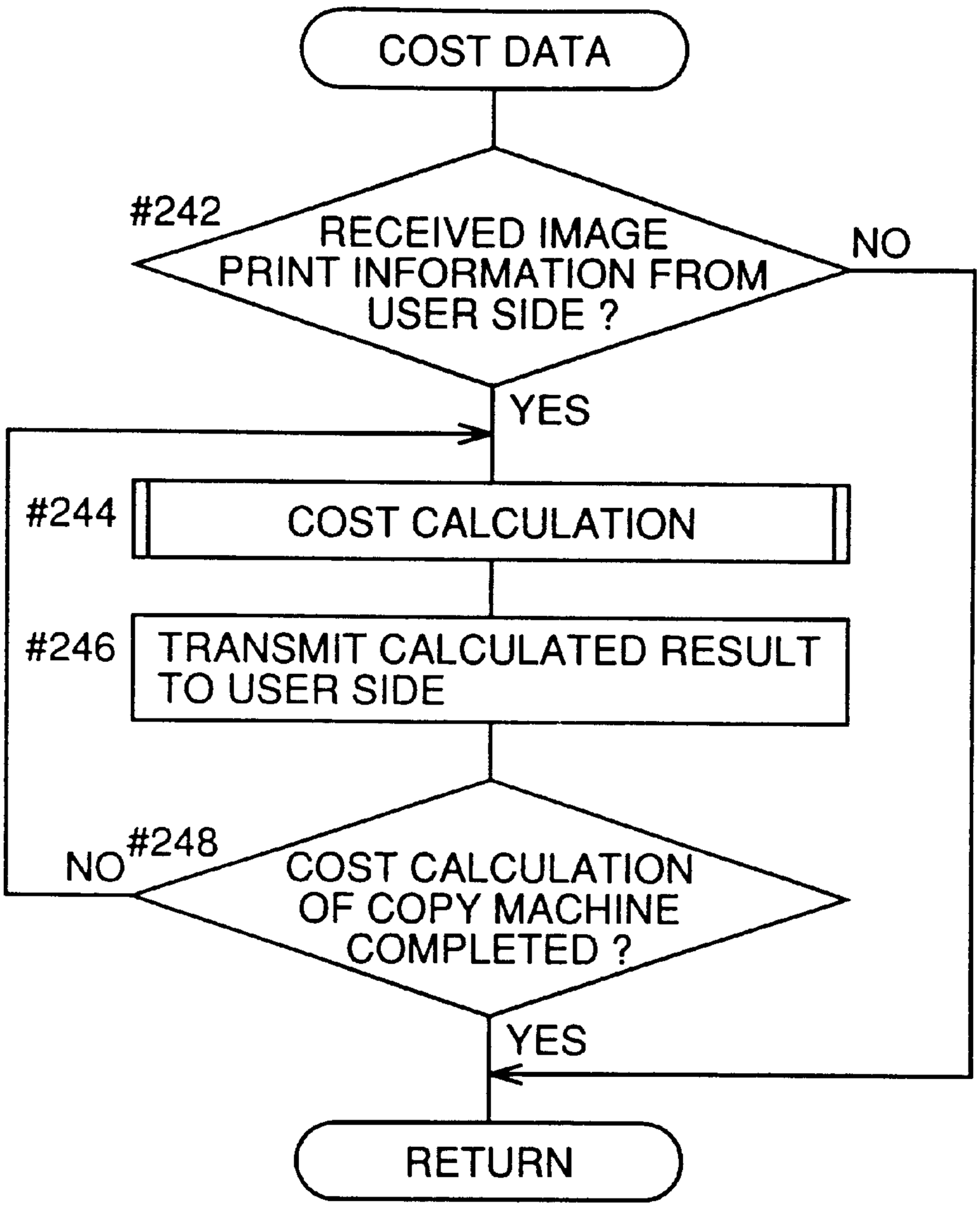

COST DATA
#242
RECEIVED IMAGE PRINT INFORMATION FROM USER SIDE ?
NO
YES
#244
COST CALCULATION
#246
TRANSMIT CALCULATED RESULT TO USER SIDE
NO
#248
COST CALCULATION OF COPY MACHINE COMPLETED ?
YES
RETURN

FIG.29

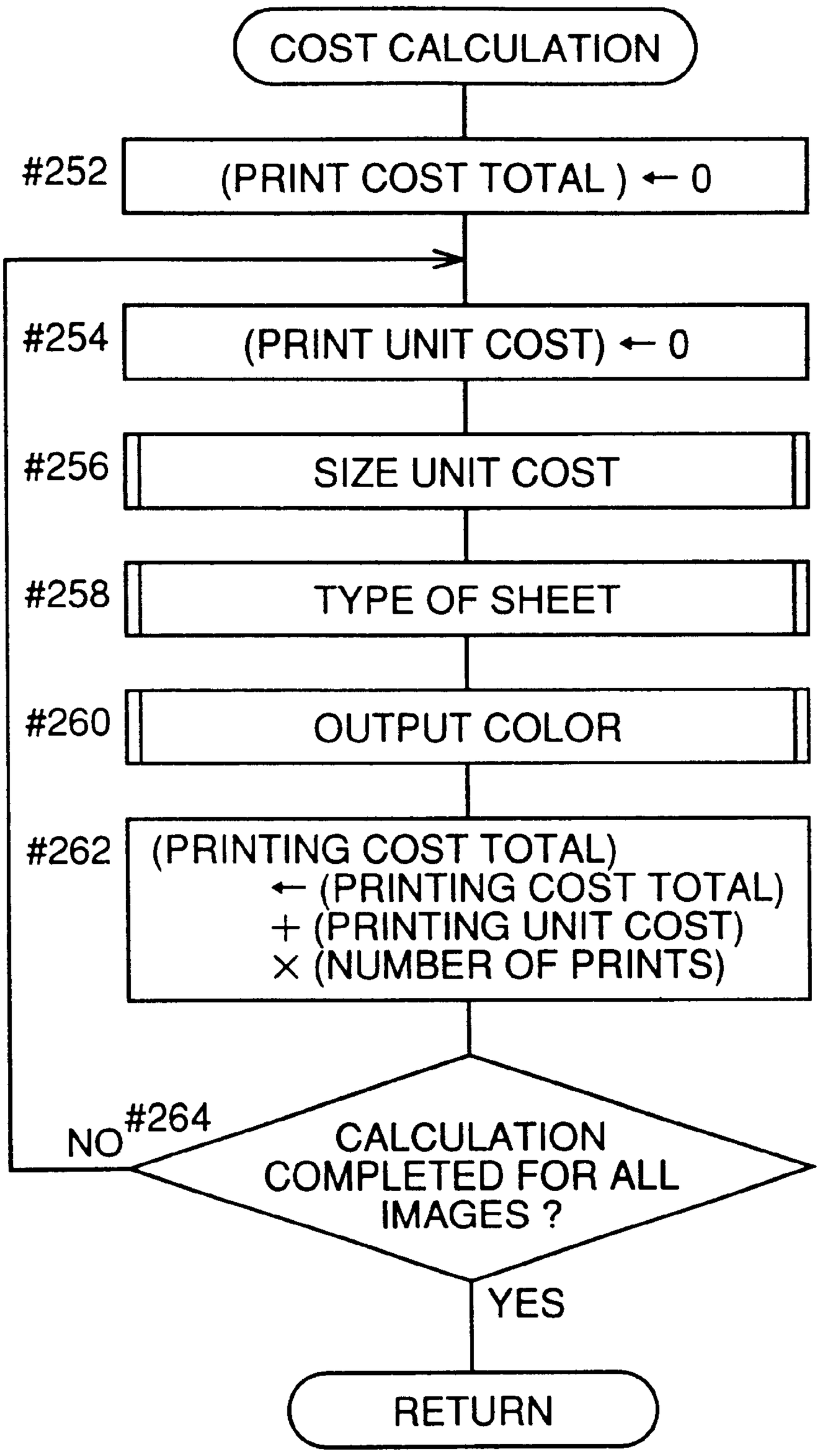

COST CALCULATION
#252
(PRINT COST TOTAL) ← 0
#254
(PRINT UNIT COST) ← 0
#256
SIZE UNIT COST
#258
TYPE OF SHEET
#260
OUTPUT COLOR
#262
(PRINTING COST TOTAL)
← (PRINTING COST TOTAL)
+ (PRINTING UNIT COST)
× (NUMBER OF PRINTS)
#264
CALCULATION COMPLETED FOR ALL IMAGES ?
NO
YES
RETURN

FIG.30

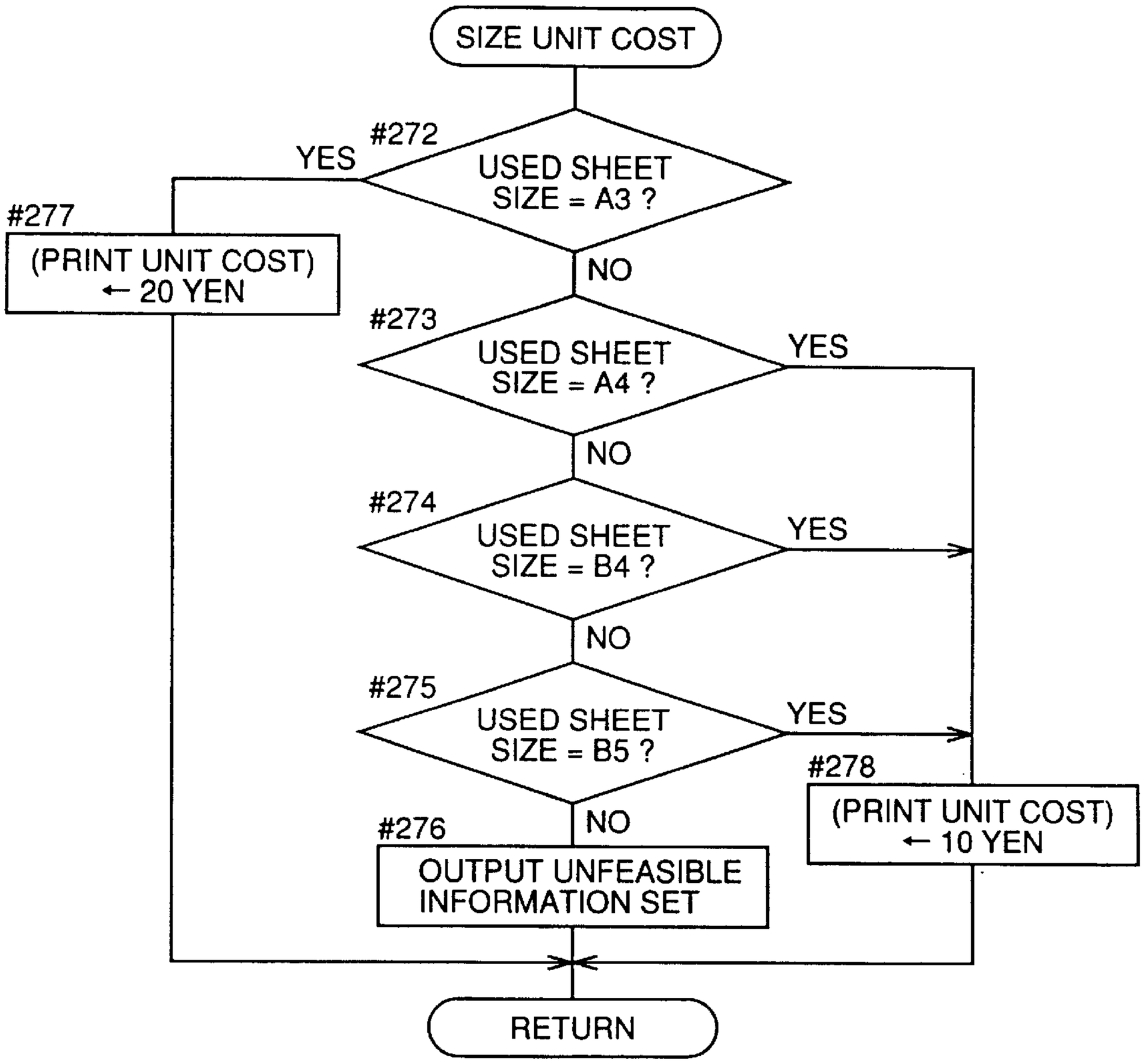

SIZE UNIT COST
#272
USED SHEET SIZE = A3 ?
YES
NO
#277
(PRINT UNIT COST) ← 20 YEN
#273
USED SHEET SIZE = A4 ?
YES
NO
#274
USED SHEET SIZE = B4 ?
YES
NO
#275
USED SHEET SIZE = B5 ?
YES
NO
#276
OUTPUT UNFEASIBLE INFORMATION SET
#278
(PRINT UNIT COST) ← 10 YEN
RETURN

FIG.31

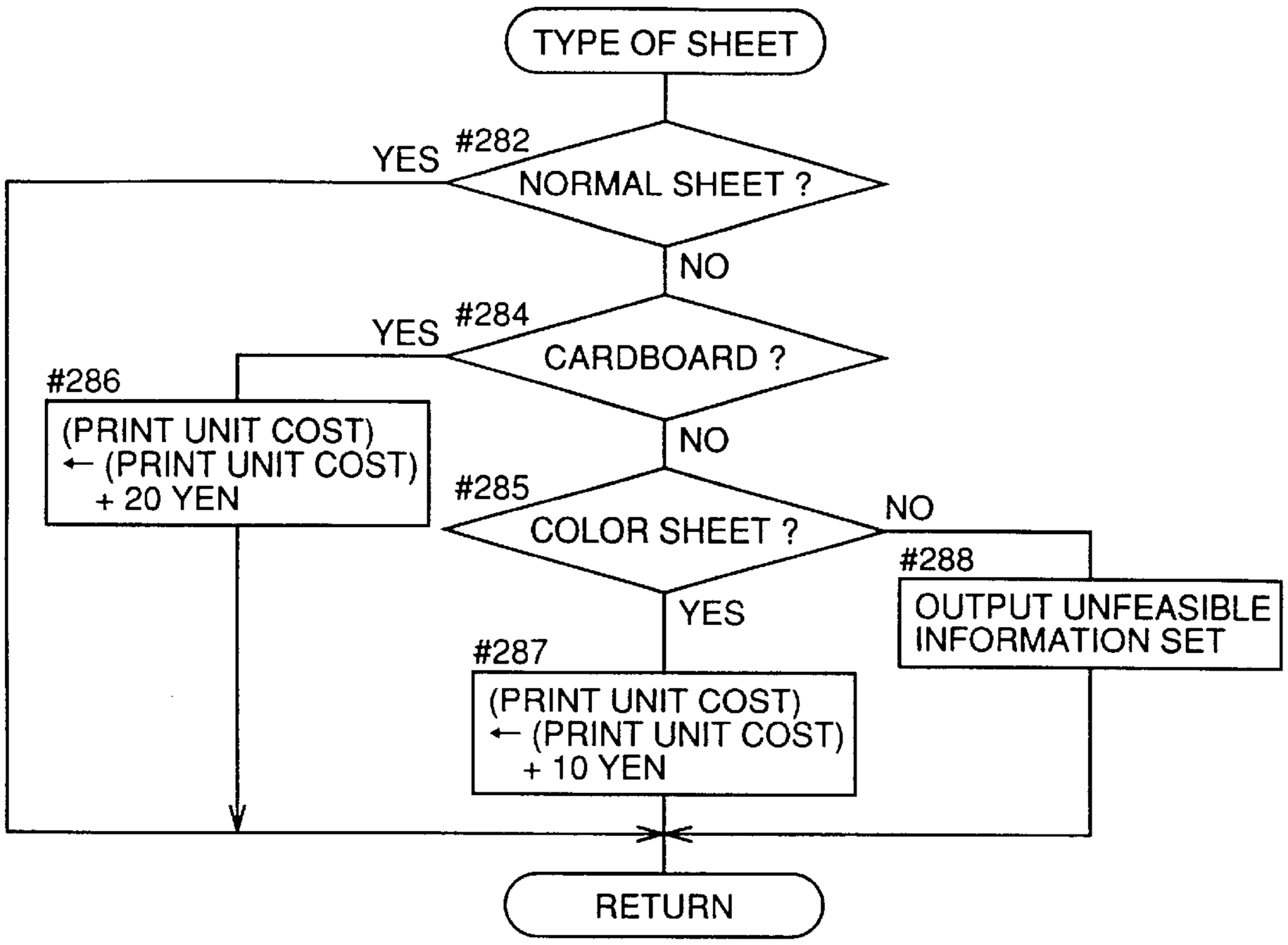

TYPE OF SHEET
#282
NORMAL SHEET ?
YES
NO
#284
CARDBOARD ?
YES
NO
#286
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 20 YEN
#285
COLOR SHEET ?
NO
YES
#288
OUTPUT UNFEASIBLE INFORMATION SET
#287
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 10 YEN
RETURN

FIG.32

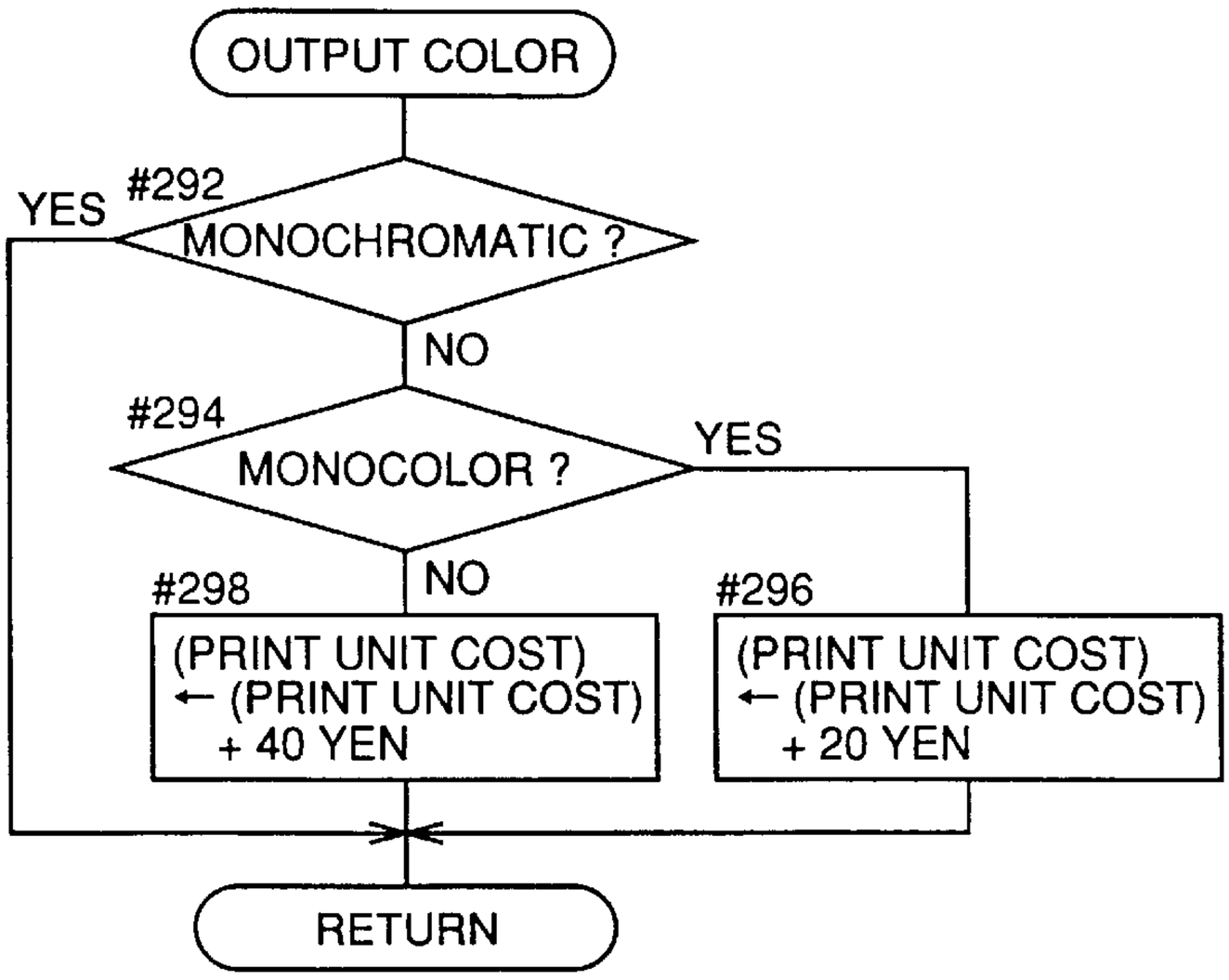

OUTPUT COLOR
#292
MONOCHROMATIC ?
YES
NO
#294
MONOCOLOR ?
YES
NO
#298
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 40 YEN
#296
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 20 YEN
RETURN

FIG.33

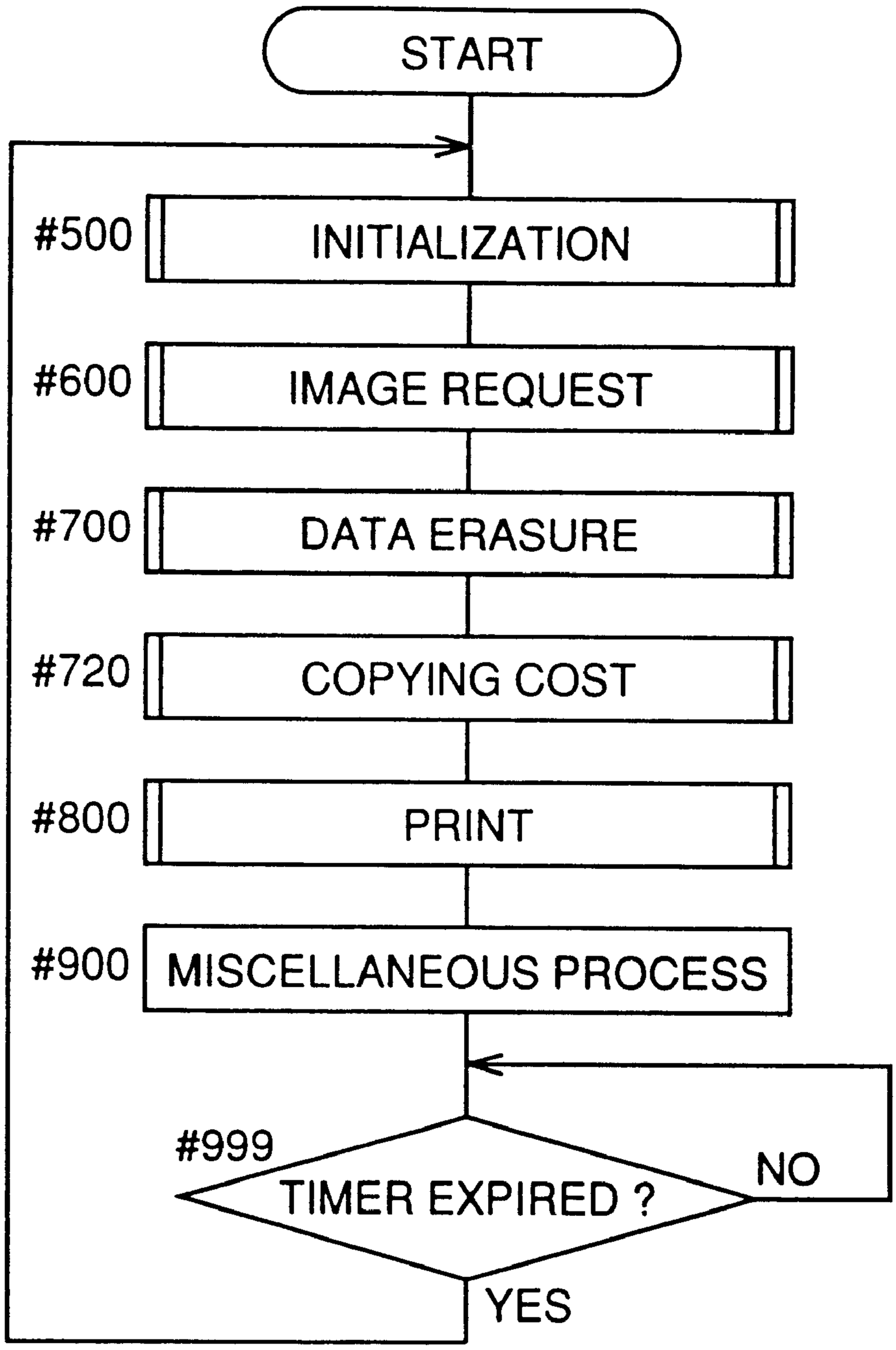

START
#500
INITIALIZATION
#600
IMAGE REQUEST
#700
DATA ERASURE
#720
COPYING COST
#800
PRINT
#900
MISCELLANEOUS PROCESS
#999
TIMER EXPIRED ?
NO
YES

FIG.34

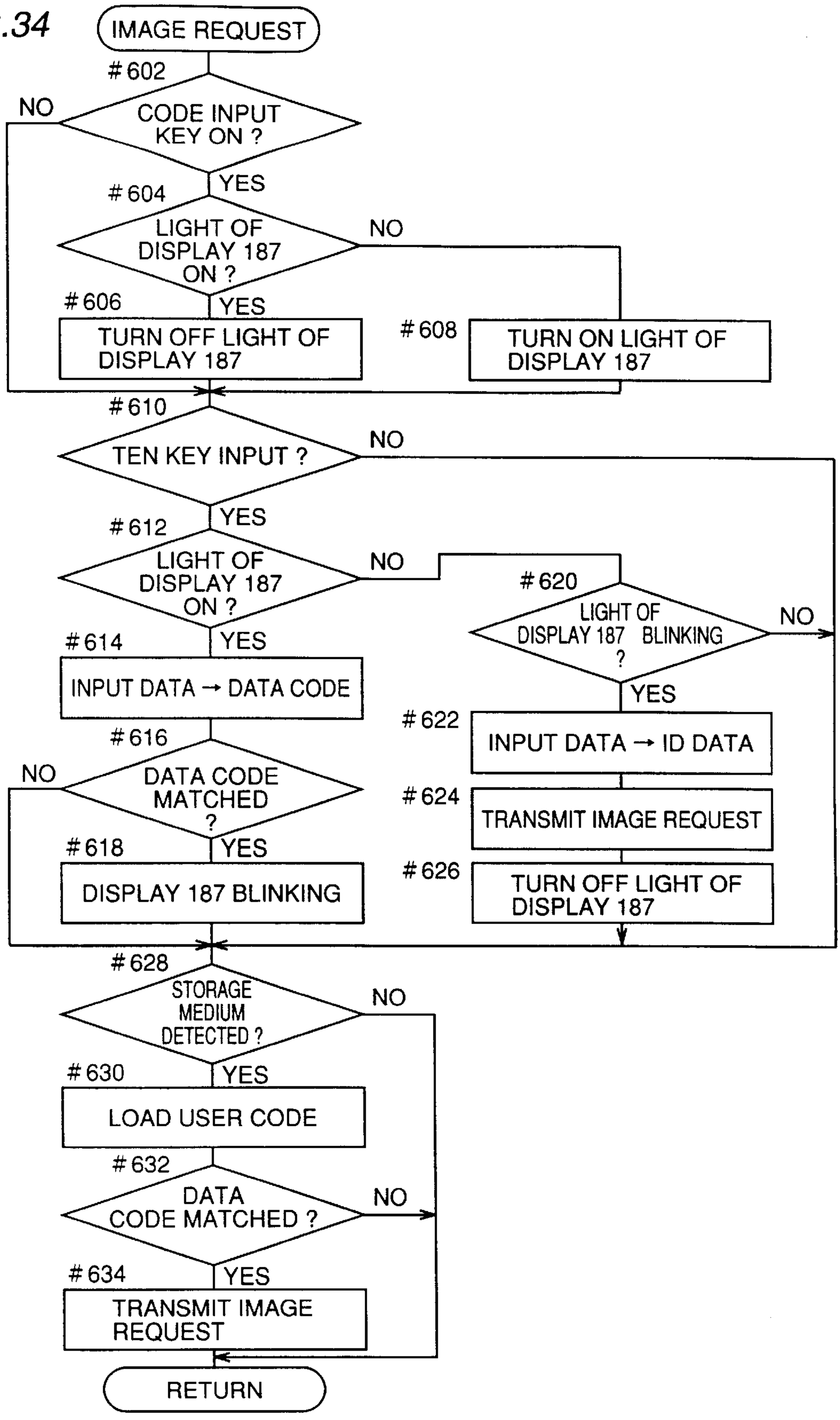


IMAGE REQUEST
#602
CODE INPUT KEY ON ?
NO
YES
#604
LIGHT OF DISPLAY 187 ON ?
NO
YES
#606
TURN OFF LIGHT OF DISPLAY 187
#608
TURN ON LIGHT OF DISPLAY 187
#610
TEN KEY INPUT ?
NO
YES
#612
LIGHT OF DISPLAY 187 ON ?
NO
YES
#614
INPUT DATA → DATA CODE
#616
DATA CODE MATCHED ?
NO
YES
#618
DISPLAY 187 BLINKING
#620
LIGHT OF DISPLAY 187 BLINKING ?
NO
YES
#622
INPUT DATA → ID DATA
#624
TRANSMIT IMAGE REQUEST
#626
TURN OFF LIGHT OF DISPLAY 187
#628
STORAGE MEDIUM DETECTED ?
NO
YES
#630
LOAD USER CODE
#632
DATA CODE MATCHED ?
NO
YES
#634
TRANSMIT IMAGE REQUEST
RETURN

FIG.35

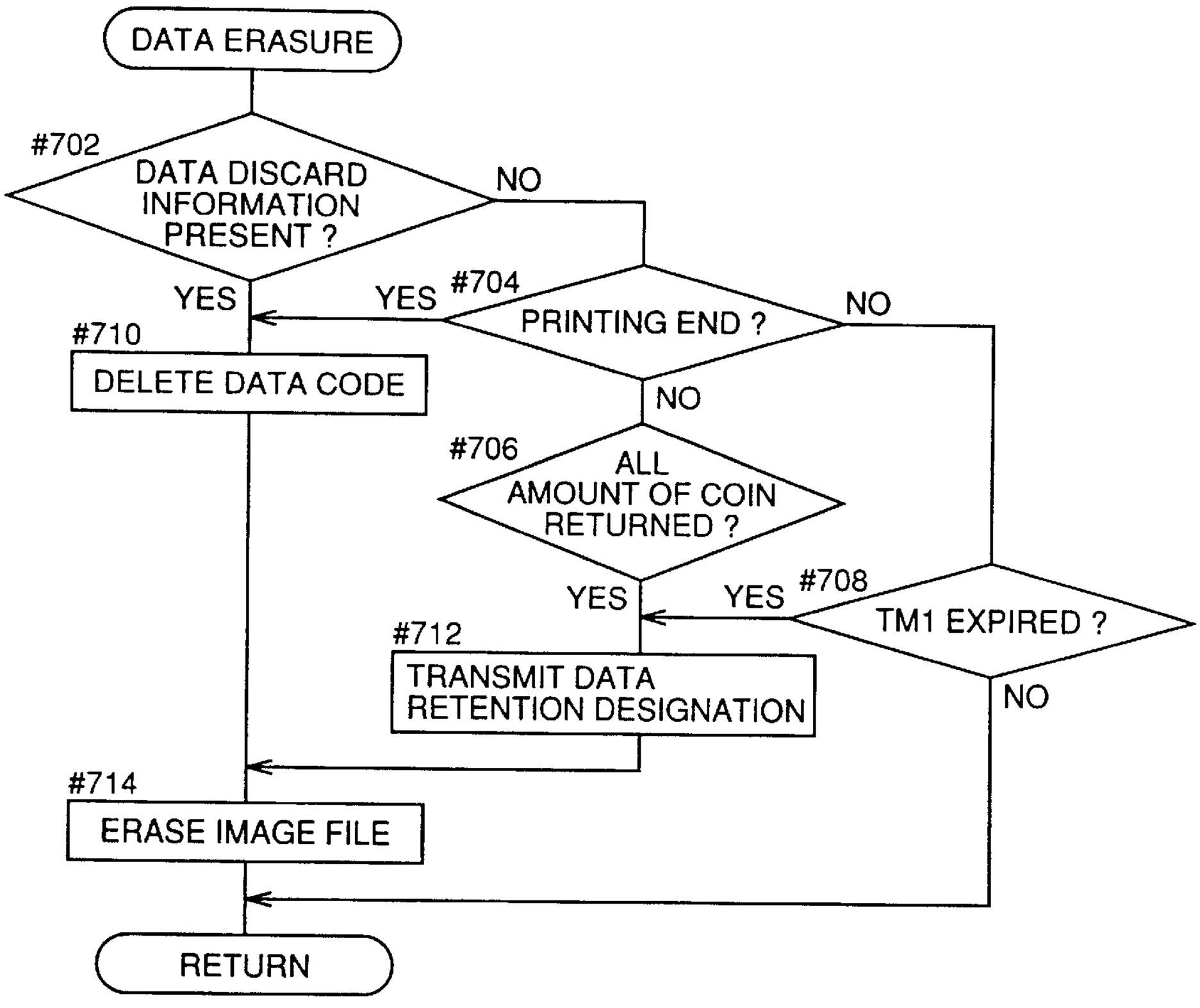

DATA ERASURE
#702
DATA DISCARD INFORMATION PRESENT ?
NO
YES
YES
#704
PRINTING END ?
NO
#710
DELETE DATA CODE
NO
#706
ALL AMOUNT OF COIN RETURNED ?
YES
YES
#708
TM1 EXPIRED ?
NO
#712
TRANSMIT DATA RETENTION DESIGNATION
#714
ERASE IMAGE FILE
RETURN

FIG.36

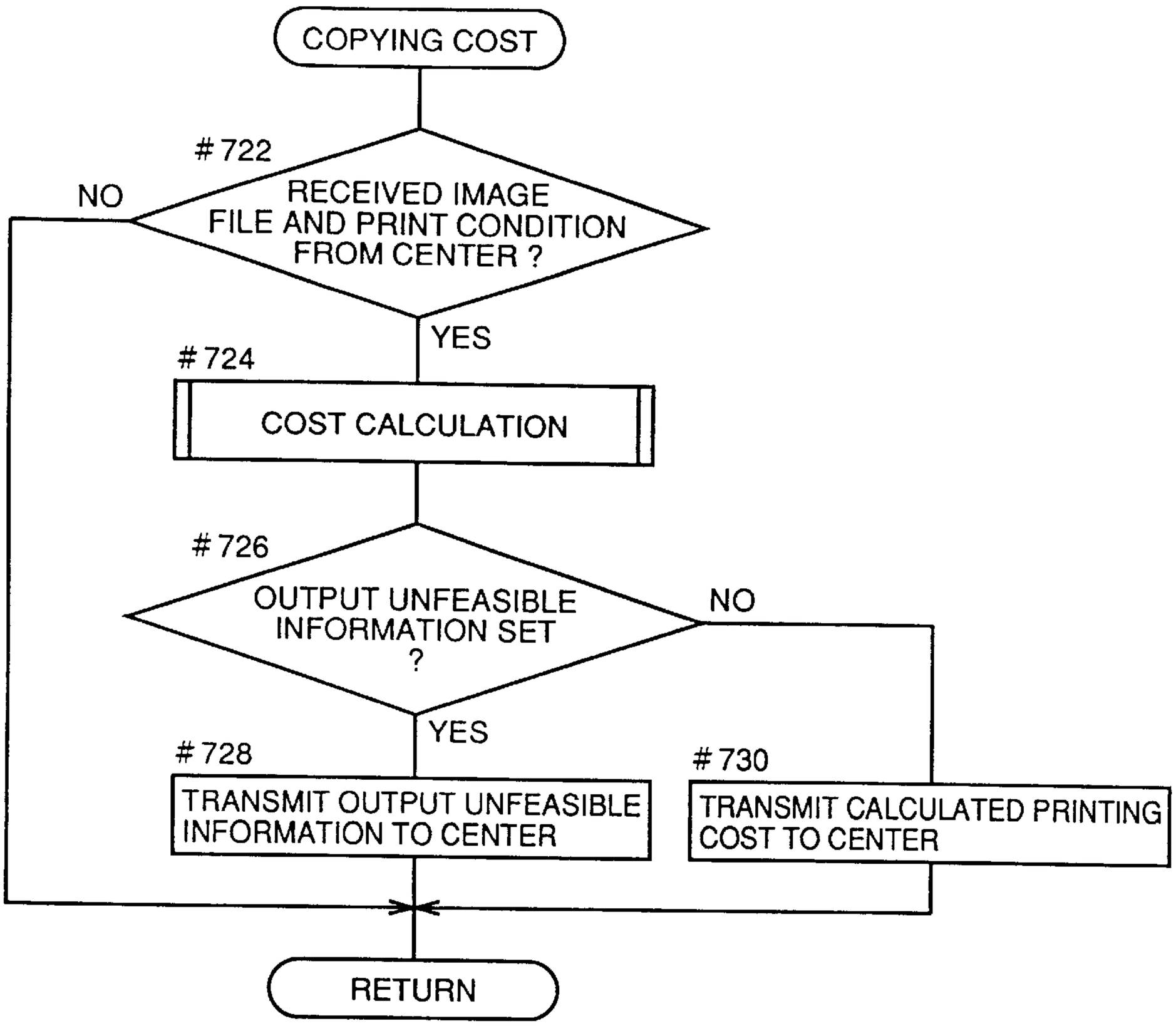

COPYING COST
#722
RECEIVED IMAGE FILE AND PRINT CONDITION FROM CENTER ?
NO
YES
#724
COST CALCULATION
#726
OUTPUT UNFEASIBLE INFORMATION SET ?
NO
YES
#728
TRANSMIT OUTPUT UNFEASIBLE INFORMATION TO CENTER
#730
TRANSMIT CALCULATED PRINTING COST TO CENTER
RETURN

FIG.37

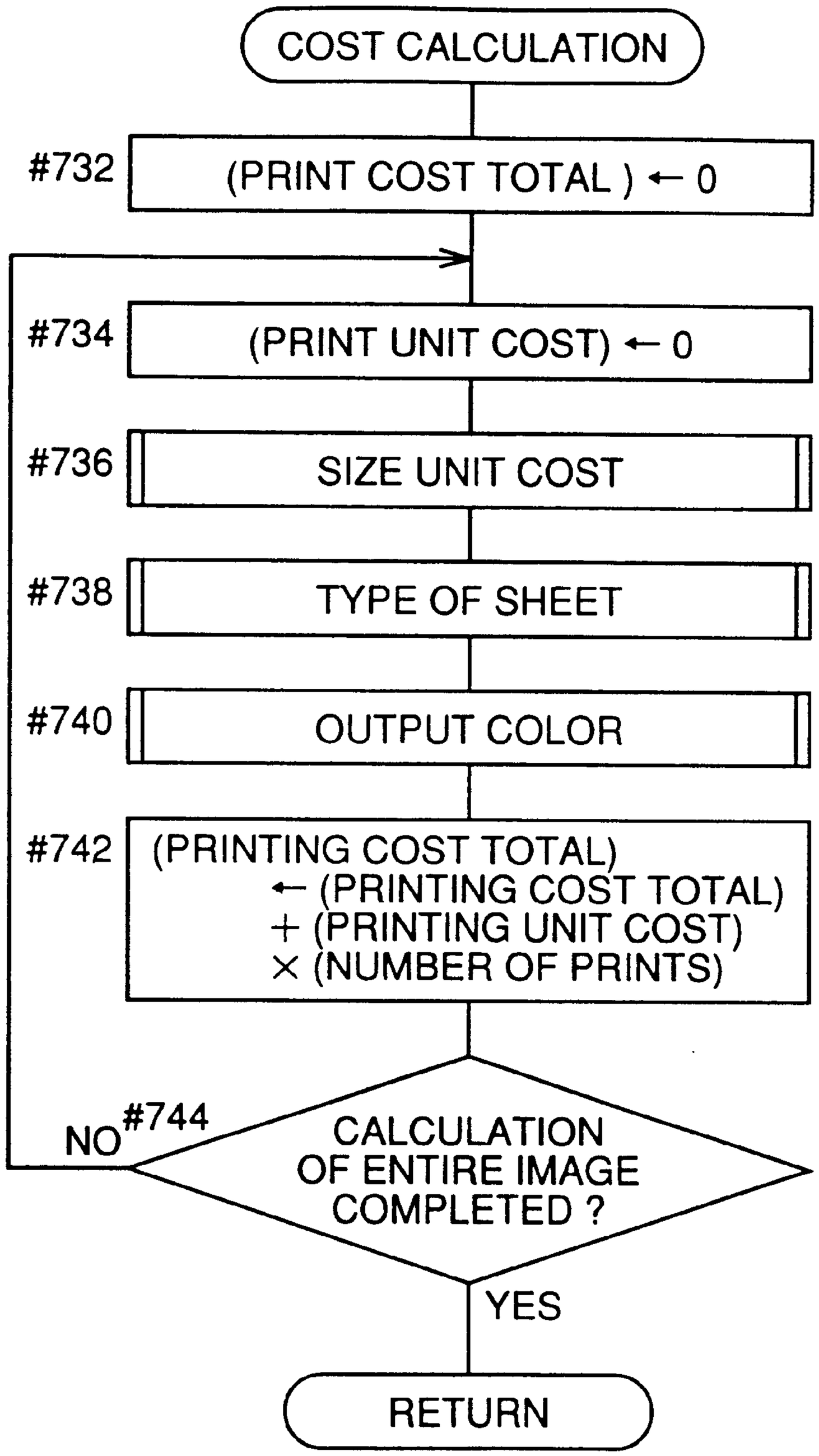

COST CALCULATION
#732
(PRINT COST TOTAL) ← 0
#734
(PRINT UNIT COST) ← 0
#736
SIZE UNIT COST
#738
TYPE OF SHEET
#740
OUTPUT COLOR
#742
(PRINTING COST TOTAL)
← (PRINTING COST TOTAL)
+ (PRINTING UNIT COST)
× (NUMBER OF PRINTS)
#744
CALCULATION OF ENTIRE IMAGE COMPLETED ?
NO
YES
RETURN

FIG.38

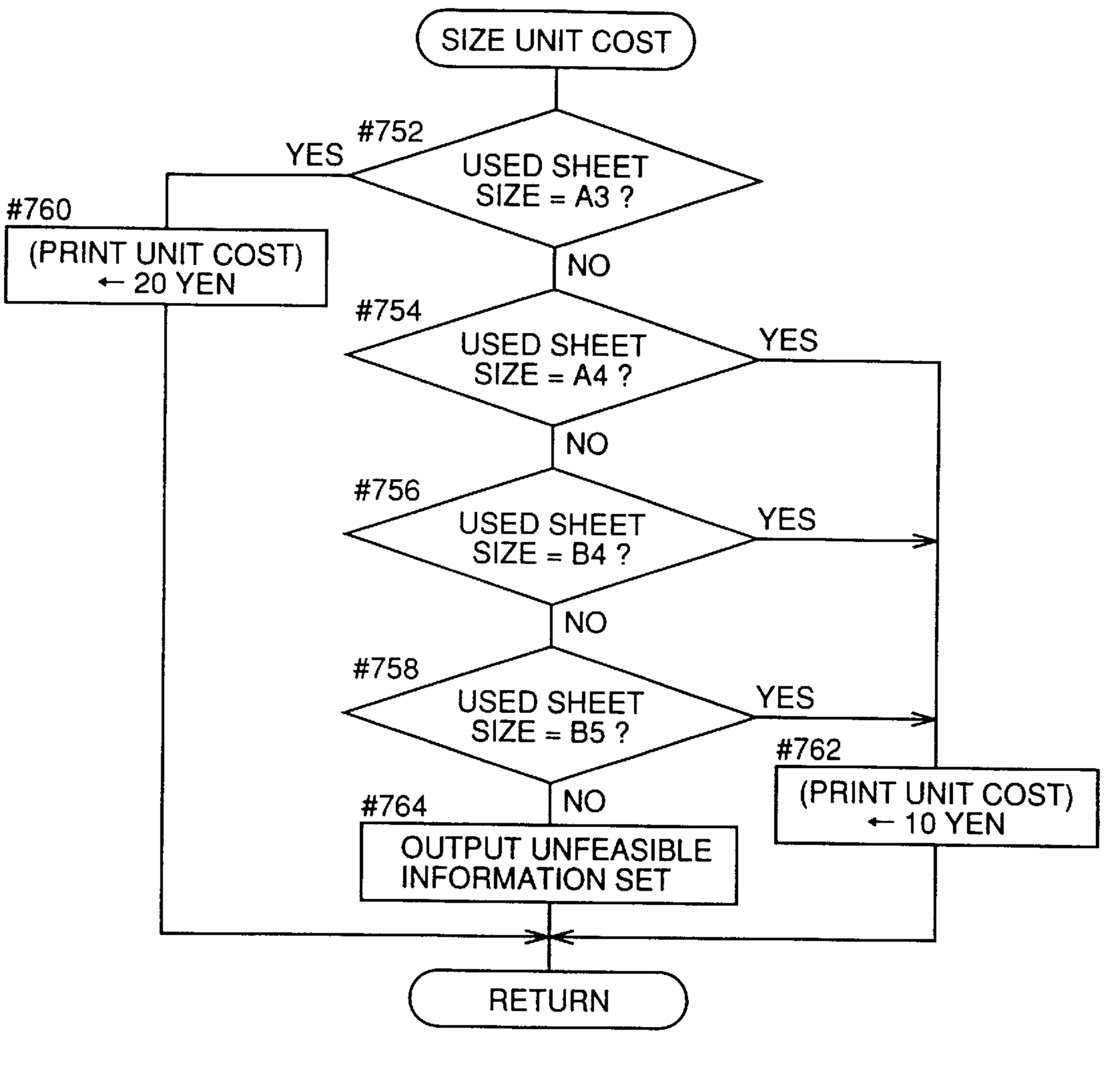

SIZE UNIT COST
#752
USED SHEET SIZE = A3 ?
YES
NO
#760
(PRINT UNIT COST) ← 20 YEN
#754
USED SHEET SIZE = A4 ?
YES
NO
#756
USED SHEET SIZE = B4 ?
YES
NO
#758
USED SHEET SIZE = B5 ?
YES
NO
#762
(PRINT UNIT COST) ← 10 YEN
#764
OUTPUT UNFEASIBLE INFORMATION SET
RETURN

FIG.39

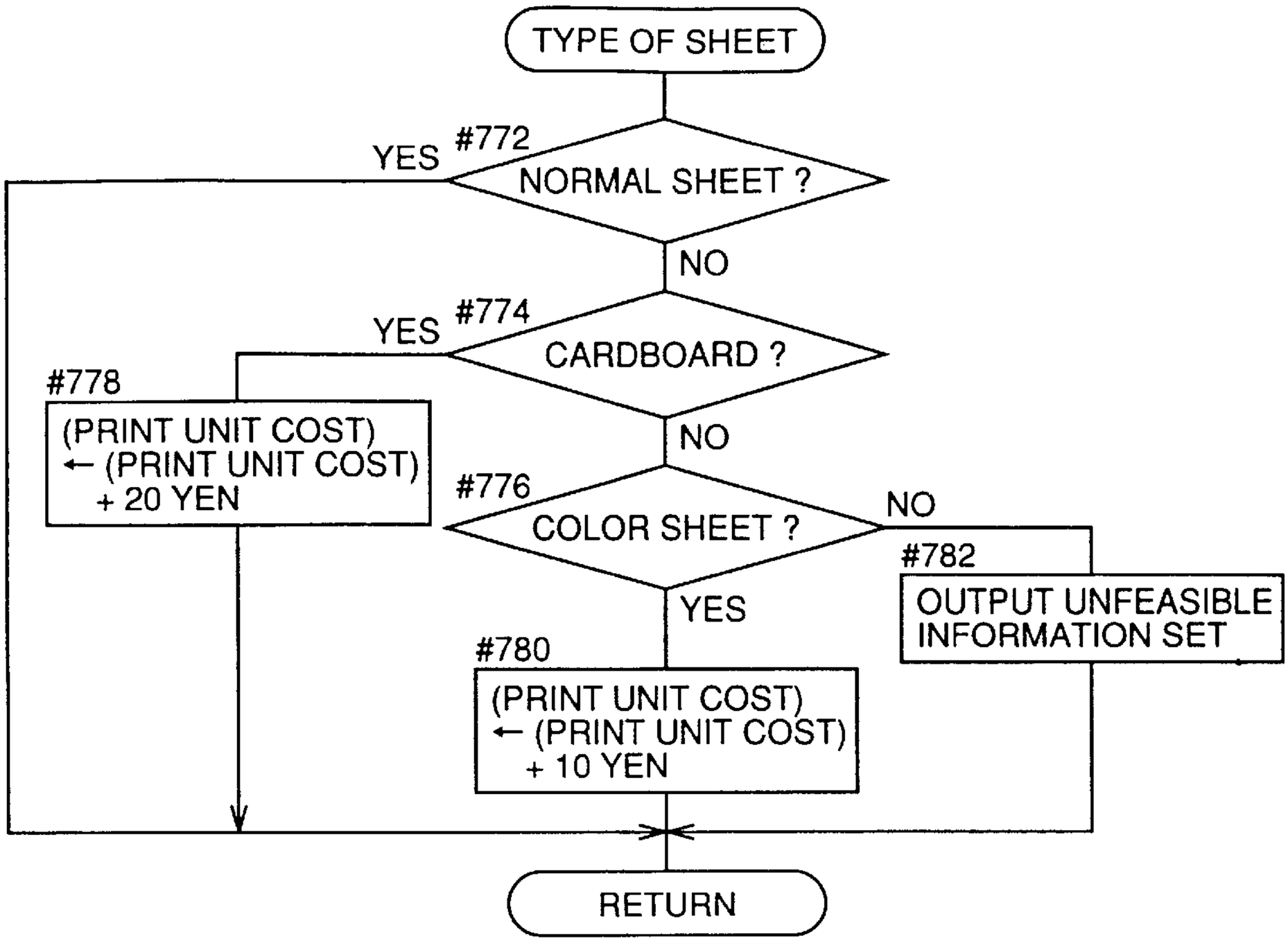

TYPE OF SHEET
#772
NORMAL SHEET ?
YES
NO
#774
CARDBOARD ?
YES
NO
#778
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 20 YEN
#776
COLOR SHEET ?
NO
YES
#782
OUTPUT UNFEASIBLE INFORMATION SET
#780
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 10 YEN
RETURN

FIG.40

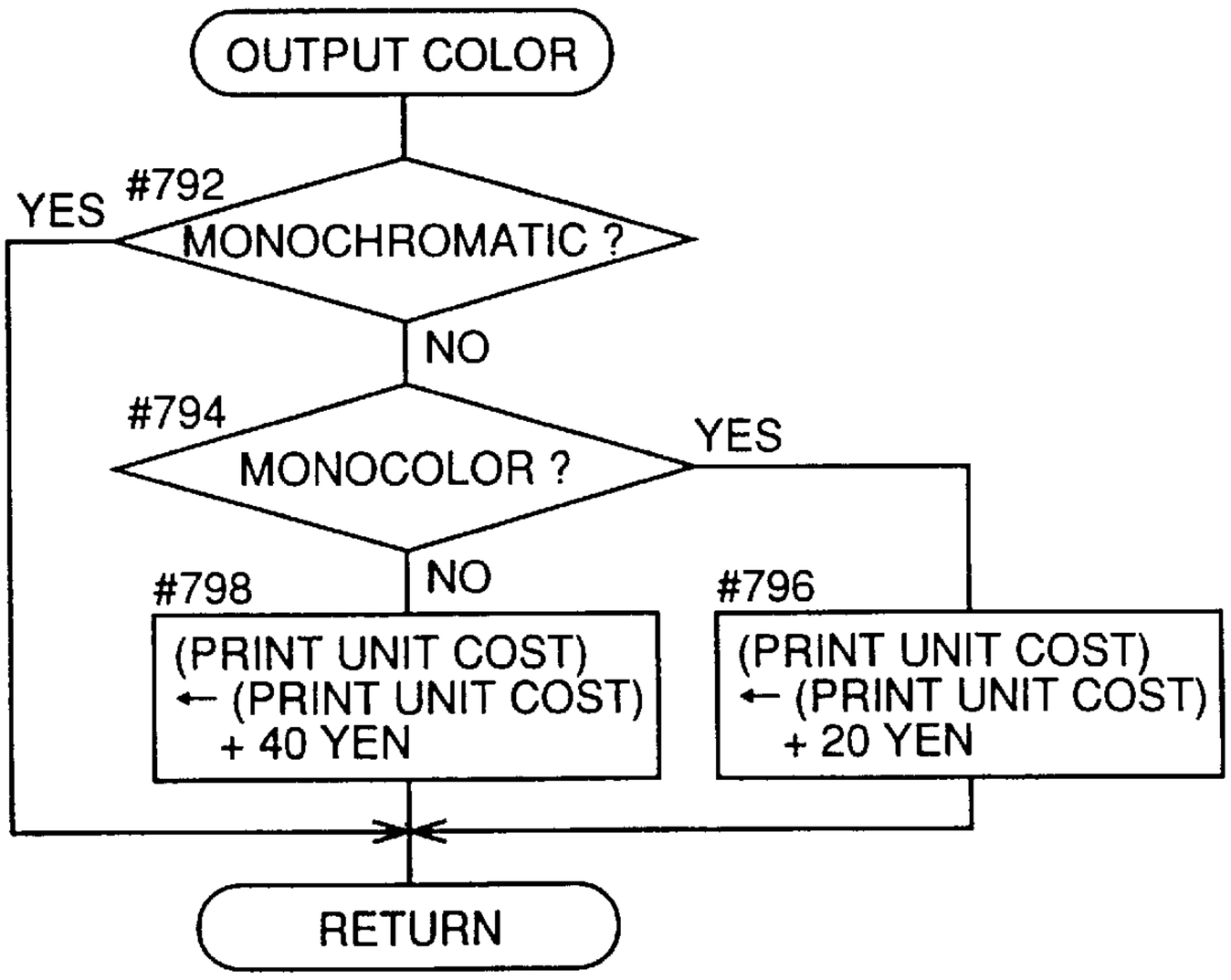

OUTPUT COLOR
#792
MONOCHROMATIC ?
YES
NO
#794
MONOCOLOR ?
YES
NO
#798
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 40 YEN
#796
(PRINT UNIT COST)
← (PRINT UNIT COST)
+ 20 YEN
RETURN

FIG.41

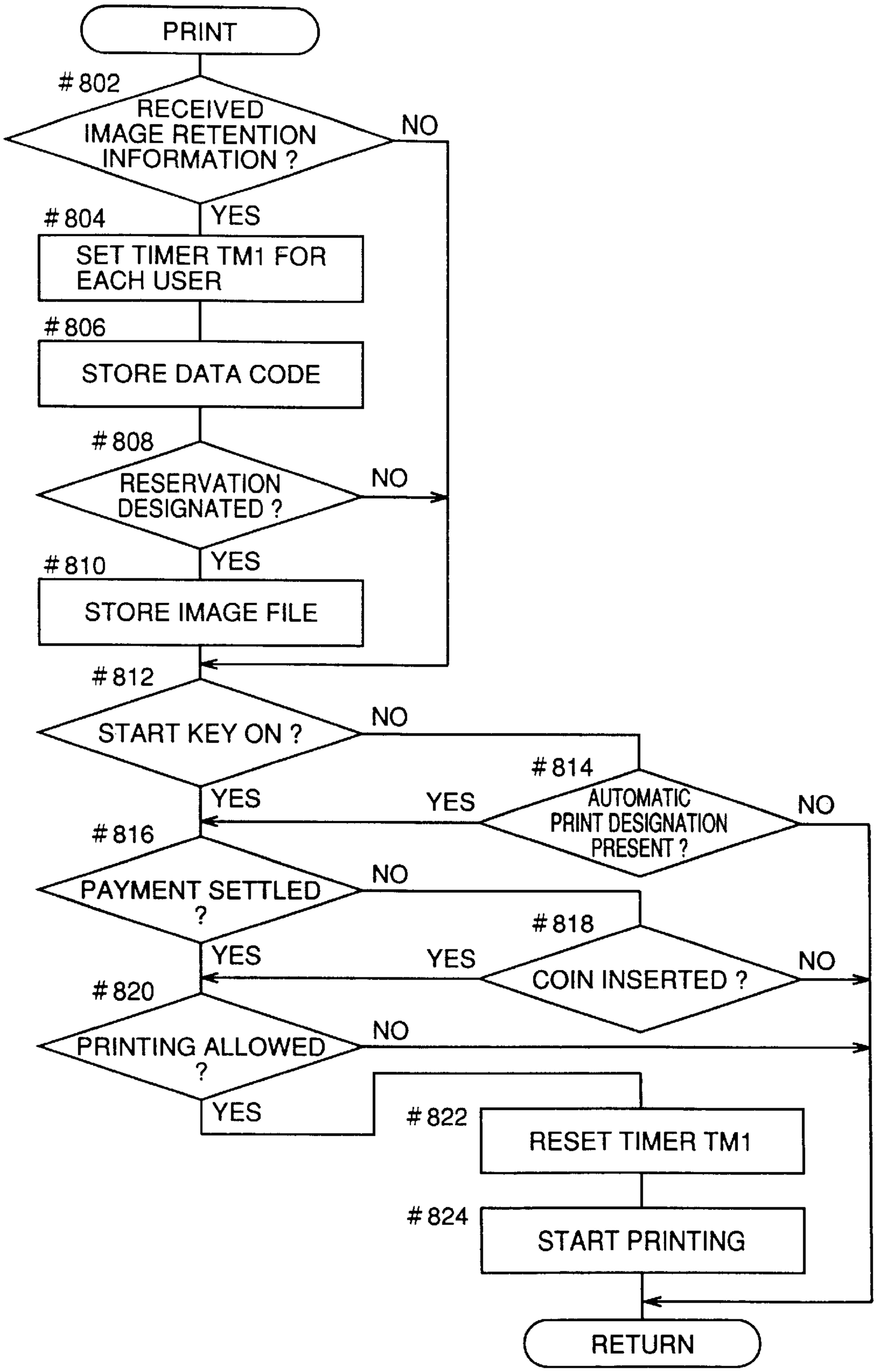

PRINT
#802
RECEIVED IMAGE RETENTION INFORMATION ?
NO
YES
#804
SET TIMER TM1 FOR EACH USER
#806
STORE DATA CODE
#808
RESERVATION DESIGNATED ?
NO
YES
#810
STORE IMAGE FILE
#812
START KEY ON ?
NO
YES
#814
AUTOMATIC PRINT DESIGNATION PRESENT ?
YES
NO
#816
PAYMENT SETTLED ?
NO
YES
#818
COIN INSERTED ?
YES
NO
#820
PRINTING ALLOWED ?
NO
YES
#822
RESET TIMER TM1
#824
START PRINTING
RETURN

FIG.42

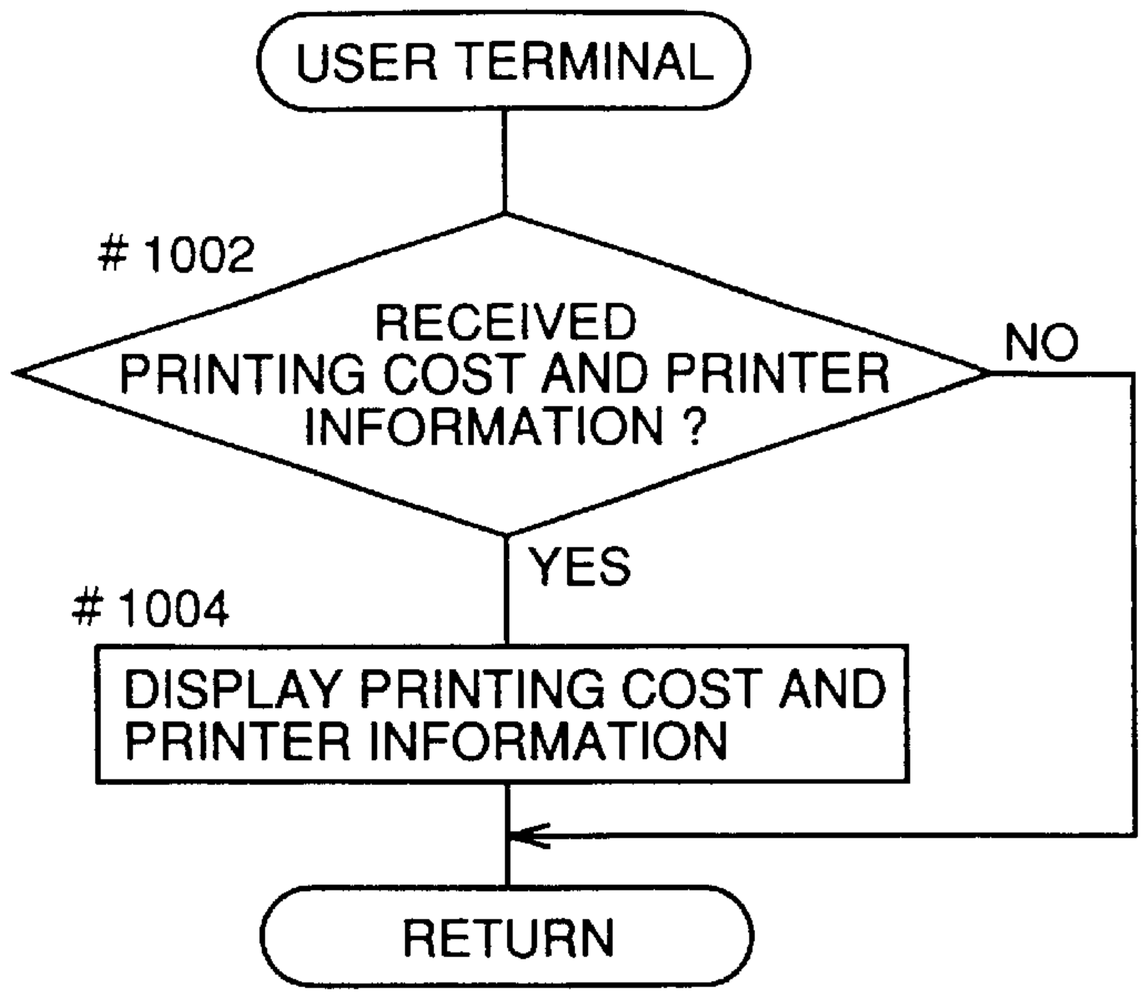
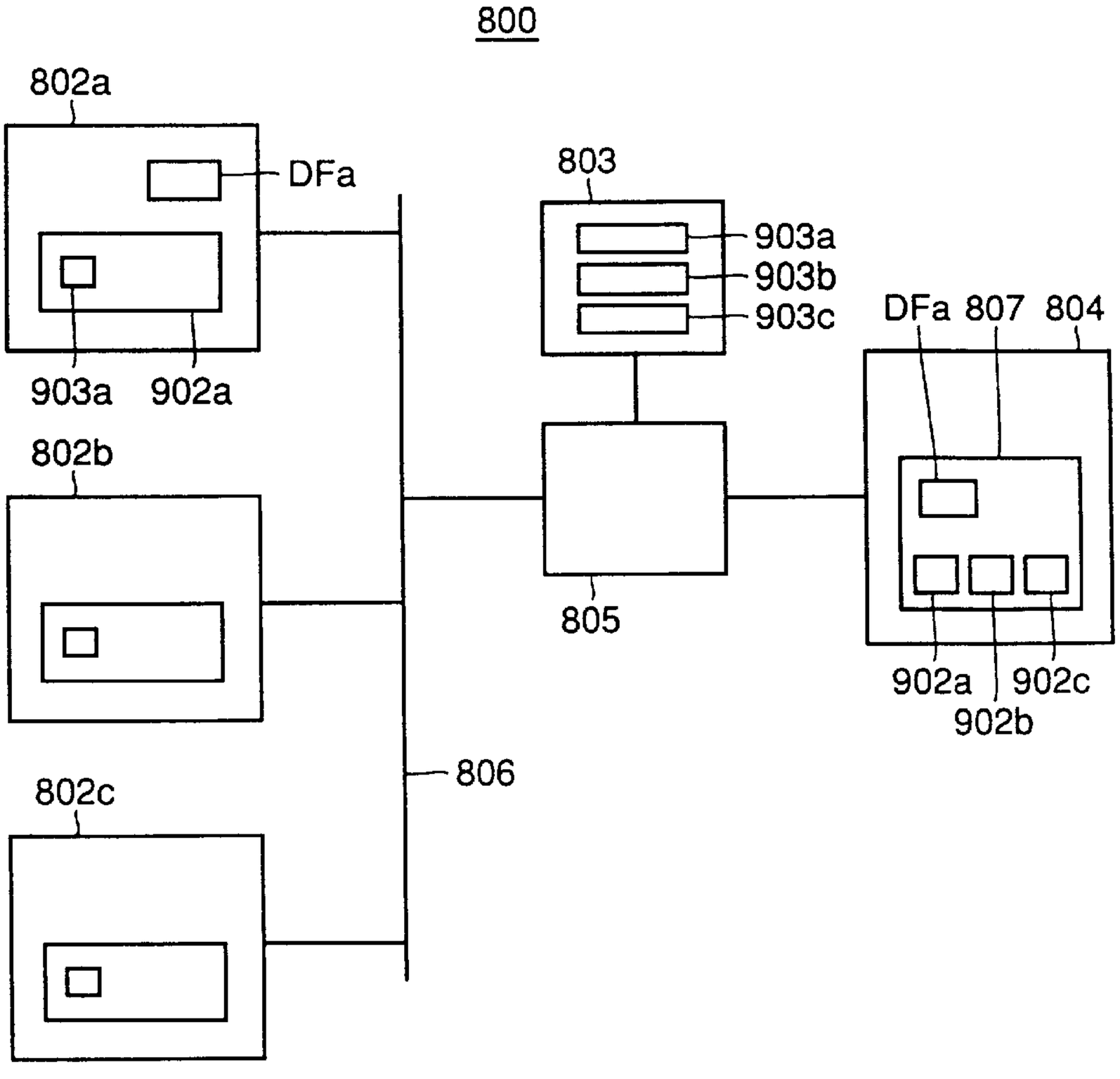


FIG.43 PRIOR ART



PRINTING SYSTEM THAT CALCULATES PRINTING COST USING DATA INPUT VIA A REMOTE DATA INPUT TERMINAL AND RETURNS CALCULATED PRINTING COST TO THE REMOTE DATA INPUT TERMINAL

This application is Continuation of Application Ser. No. 09/079,524 filed May 15, 1998 now U.S. Pat. No. 6,064,878. Printing System That Can Identify Printing Cost Beforehand

This application is based on Japanese Patent Application Nos. 9-143551 and 9-332809 filed in Japan, the contents of which are hereby incorporated by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a stand-alone or network-connected printing system. More particularly, the present invention relates to a printing system that can identify the printing cost in advance.

2. Description of the Related Art

The art of interest to the present invention for counting the number of copies to calculate the copying expense is disclosed in, for example, Japanese Patent Publication No. 3-52626 and Japanese Patent Laying-Open No. 56-27162. The technique of detecting termination of a copy operation to calculate and display the copy rate from the "number of copies×unit cost" is disclosed in Japanese Utility Model Laying-Open No. 4-11547.

There are times when the expense of a desired copy job is to be identified before actually carrying out a copy operation. The copy rate is calculated as "number of copies× unit cost". This "unit cost" depends on various conditions such as the size of the recording sheet and full color/two-color/black-and-white mode. The size of a recording sheet is determined according No the size of the original document and the magnification rate. Since the calculation of the total fee of copies taken in various modes from various documents is complicated, it is difficult to confirm in advance whether the copy fee is within an intended amount of cost or not. It is desired to easily identify in advance the cost of a specific copy job.

It is also desirable to be able to alter the mode (for example, alter the copy mode from full color mode to black-and-white mode, or alter the magnification rate to reduce the size of the recording sheet) when identification is made that the intended account is exceeded after setting a copy job. Accordingly, an intended amount of cost can be satisfied.

In accordance with the spread of personal computer communication and image softwares, the user of a personal computer can provide a display of various types of images easily on the screen of his/her own display device at home. It is easy to print out such images on a recording sheet by virtue of improvement in the printer's performance and reduction in cost.

However, a printer of high performance that provides a printout on a large-sized sheet with the picture quality of a color image approximating that of a silver halide photograph is yet too expensive for a general user to own.

A printing system is proposed that allows-printout of a high quality even for users that do not posses their own exclusive color printer of high performance. In this printing system, the personal computer of a user is connected to a color printer of high performance via a communication line. Each user shares the usage of the connected color printer.

FIG. **43** is a schematic block diagram of a conventional printing system **800**.

Referring to FIG. **43**, a printing system **800** includes personal computers **802***a*–**802***c* of respective users, a color printer **804** of high performance, a printer controller **805** for providing control of color printer **804**, a display **803** associated with printer controller **805**, and a communication line **806**. Each of personal computers **802***a*–**802***c* is installed at the home of respective users. Color printer **804** and printer controller **805** are installed at an appropriate site, such as in a convenience store.

When a user wants to obtain a printout, the user enters an image file DFa into a personal computer **802***a*, for example, and also a print reservation instruction and user name at the same time.

In response, personal computer **802***a* assigns an image file number **903***a* for the input image file DFa, and transmits the same together with the user name as a header file **902***a* to printer controller **805** and color printer **804**. Therefore, header files **902***a*–**902***c* transmitted from various users are accumulated in printer controller **805** and color printer **804**. At this time point, image file DFa is not yet transmitted.

The user then goes to the convenience store where printer controller **805** and color printer **804** are installed to instruct execution of a printout operation. On the screen of display **803** of printer controller **805**, a plurality of image file numbers **903***a*–**903***c* and associated user names sent from respective users are provided.

The user searches for his/her own user name and image file number **903***a* to enter a print execution instruction with respect to the appropriate image file number **903***a*. In response, image file DFa is transmitted from personal computer **802***a* to color printer **804** to be stored in a memory **807** of printer **804**. The user sets the appropriate printing conditions such as the sheet size, resolution of picture quality, the number of copies, and the like for color printer **804**. The cost required for the printing operation is determined, and then a printing operation is executed.

In the above-described conventional printing system **800**, the user had to take the trouble of going to the installed site of color printer **804** and then set the printout conditions for color printer **804**. The user can identify the expense corresponding to a printout execution only after setting various printing out conditions for color printer **804**.

In other words, some time is required before the user obtains a printout of a desired image after going to the installation site of color printer **804**. Furthermore, the user cannot identify the expense information required for printout before coming to the installed site of color printer **804**.

SUMMARY OF THE INVENTION

In view of the foregoing, an object of the present invention is to provide a printing system that can identify the expense of a desired printout job prior to a printing out operation.

Another object of the present invention is to provide a printing system that allows the printing mode to be altered so as to satisfy an intended amount of cost when the expense for a printing out job exceeds the intended amount.

A further object of the present invention is to provide a printing system that can execute a printing out job after confirming that an intended amount of cost is satisfied when the cost for a printing out job is predetermined.

Still another object of the present invention is to provide a printing system connected to a network including a printer

apparatus that is network-connected to a user side data processor that allows the user to obtain, at the user side data processor, information of expense required for a print out before the user goes to the installed site of the printer apparatus.

A still further object of the present invention is to provide a printing method that allows expense of a desired printing out job to be identified prior to the printing out job.

Yet a further object of the present invention is to provide a printing method that allows a printing out job to be carried out after confirmation of an intended amount of cost being satisfied when the cost for a printing out job is predetermined.

Yet another object of the present invention is to provide a printing method of a printing system connected to a network including a printer apparatus network-connected to a user's terminal that allows the user to obtain, at the user's terminal, information of expense required for a print out before the user goes to the installed site of the printer apparatus.

The above objects of the present invention can be accomplished by a printing system including elements set forth in the following.

According to an aspect of the present invention, a printing system includes an input unit for entering a print job, a calculation unit for calculating a printing cost according to an input printing job, a display for providing a display of the calculated printing cost, and a controller allowing modification of the displayed printing job, and permitting a printing operation after confirming that there is no modification in the displayed printing job.

According to the present invention, the printing cost is calculated and displayed according to an input printing job. Since modification of the displayed printing job is allowed and a printing operation is permitted after confirming that there is no modification, the expense of the desired copy job can be identified prior to execution of the printing operation. The mode can be altered so as to satisfy a predetermined amount of cost. A copy operation can be initiated after confirming that a predetermined amount is satisfied.

According to another aspect of the present invention, a printing system includes a user side data processor for sending a data file that the user wishes to print out, a center side data processor connected to the user side data processor through a communication line, and having a memory for storing the data file sent from the user side data processor, and a printer connected to the center side data processor for printing out the data file sent from the center side data processor.

The printer includes a first printing cost information transmitter for transmitting printing cost information which is the information of expense corresponding to execution of printing out the data file to the center side data processor prior to execution of printing out the data file.

The center side data processor includes a second printing cost information transmitter for transmitting the printing cost information from the printer to the user side data processor.

The user side data processor, the center side data processor, and the printer are connected via a communication line. The printer sends the information of expense required for printout execution to the user side data processor prior to execution of the printing operation. As a result, the user can obtain, at the user side data processor prior to going to the installed site of the printer apparatus, information of expense required for printing by the printer apparatus that is network-connected to the user side data processor.

According to a further aspect of the present invention, a printing system includes a user side data processor for transmitting a data file of which the user wishes to print out, a center side data processor connected to the user side data processor through a communication line, and having a memory for storing the data file transmitted from the user side data processor, and a printer connected to the center side processor for printing out the data file sent from the center side data processor.

The center side data processor includes a printing cost calculation unit for calculating printing cost information which is the information of expense corresponding to a printout execution of a data file prior to print out thereof, and a printing cost information transmitter for transmitting the printing cost information to the user side data processor.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is a center cross sectional view schematically showing the entire structure of a copy machine according to a first embodiment of the present invention.

FIG. **2** is a block diagram showing an image signal process of the copy machine of FIG. **1**.

FIG. **3** is a block diagram showing a histogram generation unit in FIG. **2**.

FIG. **4** is a diagram for describing sampling of pixels for generating a histogram.

FIG. **5** is a diagram for describing an ACS (Auto Color Select) process.

FIG. **6** is a diagram for describing the method of detecting the document size.

FIG. **7**A is a diagram for describing an operation panel, and FIG. **7**B is a block diagram showing the signal input/output of a control CPU of a copy machine.

FIGS. **8**A–**8**C are diagrams showing a display of a liquid crystal panel in FIGS. **7**A and **7**B.

FIG. **9** is a flow chart showing the main routine of the process of the CPU of FIGS. **7**A and **7**B.

FIG. **10** is a flow chart showing the cost calculation process of FIG. **9**.

FIG. **11** shows an entire structure of a printing system according to a second embodiment of the present invention.

FIG. **12** is a block diagram showing in detail the function of the printing system.

FIG. **13** shows the entire structure of a copy machine according to the present invention.

FIG. **14** is a top view of an image reader of a copy machine.

FIG. **15** shows an operation panel of a copy machine.

FIG. **16** shows a vendor panel of a copy machine.

FIG. **17** is a block diagram showing a structure of a control unit of a copy machine.

FIG. **18** shows an example of a structure of image printing information stored in a center side data processor.

FIG. **19** is a diagram for describing the relationship of data code, ID code, and the printing condition.

FIG. **20** shows various items of the printing condition.

FIGS. **21** and **22** show the process sequences of first and second specific examples in the second embodiment.

FIG. **23** shows the contents of copy machine information.

FIG. **24** shows the sequence of the entire process and operation of the printing system.

FIG. **25** is a flow chart showing the overall process of the center side data processor.

FIG. **26** is a flow chart showing the contents of a reception process.

FIG. **27** is a flow chart showing the contents of a cost data process of a first specific example.

FIG. **28** is a flow chart showing the contents of a cost data process according to a second specific example.

FIG. **29** is a flow chart showing the contents of a cost calculation process according to the second specific example.

FIG. **30** is a flow chart showing the contents of a size unit cost process according to the second specific example.

FIG. **31** is a flow chart showing the contents of a sheet type process according to the second specific example.

FIG. **32** is a flow chart showing the contents of an output color process according to the second specific example.

FIG. **33** is a flow chart showing the overall process of a copy machine according to the first specific example.

FIG. **34** is a flow chart showing the contents of an image request process.

FIG. **35** is a flow chart showing the contents of a data erasure process.

FIG. **36** is a flow chart showing the contents of a copy cost process according to the first specific example.

FIG. **37** is a flow chart showing the contents of a cost calculation process according to the first specific example.

FIG. **38** is a flow chart showing the contents of a size unit cost process according to the first specific example.

FIG. **39** is a flow chart showing the contents of a sheet type process according to the first specific example.

FIG. **40** is a flow chart showing the contents of an output color process according to the first specific example.

FIG. **41** is a flow chart showing the contents of a print out process.

FIG. **42** is a flow chart showing the contents of a display process in the user side data processor.

FIG. **43** is a block diagram schematically showing a conventional printing system.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIRST EMBODIMENT

Referring to FIG. **1**, a copy machine forming the printing system in which the present invention is applied is a electronic photographic digital color copy machine employing laser exposure. An automatic document feeder **2** is provided on a glass platen **81**. The copy machine of this system is well known, and the mechanism will be described only briefly hereinafter.

1. Mechanism and Operation of Copy Machine

A document set on a document tray **3** of automatic document feeder **2** is fed leftwards in the drawing one by one through a sheet feed roller **64** and a transportation belt **67** that are operated in response to a start key **642** turned on in the operation panel (FIG. **7**A) of the copy machine. As a result, the document is set on glass platen **81** of the copy machine. This completion of setting can be determined by a detection signal of a sensor not shown or according to the elapse of time and the feeding speed from a detected time point. When the setting is completed, a document reader **30** is operated to read out the document. When termination of a reading operation is notified through a relevant signal from document reader **30** to a CPU **410** (FIG. **7**B), the read out document is conveyed leftwards in the drawing by transportation belt **67** to be discharged out on a discharge tray **70**. The feed, set, and discharge operation of the document is repeated until there are no more documents on document tray **63**. The presence of a document on document tray **63** is detected by a sensor not shown and signaled to CPU **410**.

When a document is set on glass platen **81** by automatic document feeder **62**, image reader **80** has the document scanned by a scanner **82** that is moved by the driving force of a pulse motor **85**. A reflected image is converted photoelectrically by a CCD (line image sensor) **301**. The obtained image signals of R, G and B are converted into image data for laser exposure by an image signal processor **330** and stored in a buffer memory **335**. The process carried out by image signal processor **330** will be described afterwards.

At an image recorder **75**, electrophotographic image recording by laser exposure is carried out.

First, a laser device **76** is driven according to the image data from buffer memory **335** to output a laser beam modulated by the image data. The rotary charged surface of a photoconductor drum **86** is scanned in the direction of the shaft by the laser beam. An electrostatic latent image corresponding to the image data is formed. This electrostatic latent image is toner-developed by any of the toner developing units (any developing unit of magenta M, cyan C, yellow Y and black Bk) provided in an elevating manner within developing unit **60**.

In a full color mode, an electrostatic latent image corresponding to each color is sequentially formed and developed to be transferred (details provided afterwards). This operation is carried out for four times in total.

The visible image subjected to toner development on the surface of photoconductor drum **86** is transferred onto a recording sheet on the surface of a transfer drum **90** that is rotated in synchronization with photoconductor drum **86**. In the case of a full color mode, the visible images corresponding to the toner of four colors are transferred in an overlaid manner on the same recording sheet. The toner images are sequentially overlaid by a total of four operations. A recording sheet of a selected size is fed at a predetermined timing from an appropriate one of sheet feed trays **92–94** or from a sheet refeed tray **91** and wound around transfer drum **90**.

When the transfer of the toner images is completed (transfer of four colors when in a full color mode), the recording sheet is detached from transfer drum **90** to be sent to a fixation device **97** to be subjected to an image fixation process by thermal compression through fixation device **97** and then discharged to discharge tray **99**. In the case where a further image recording operation is to be carried out on the same recording sheet in the duplex copy mode, the recording sheet subjected to an image fixation process is sent to sheet refeed tray **91**, not to discharge tray **99**, and fed again at a predetermined timing for a further image recording process.

2. Process at Image Signal Processor **330**

The process carried out by image signal processor **330** will be described with reference to FIG. **2**. Each block in image signal processor **330** operates according to a signal (drive pulse and the like) from a control signal generation unit **320** and the operation parameters sent from CPU **310**. CPU **310** operates according to the command communication with CPU **410** (refer to FIG. **7**B) that provides the

overall control of the copy machine. The type of command from CPU **410** corresponds to the mode specified by the user through operation panel **640** (FIG. **7**A).

Each image signal of R, G, and B (red, green and blue) generated by photoelectric conversion at CCD **301** is first sent to an analog amplifier·S/H (Sample Hold) process block **302** to be amplified and sample-held. Then, the signal is sent to an A/D conversion block **303** to be converted into digital image data.

Each digital data of R, G, and B output from A/D conversion block **303** is provided to a shading correction block **304** to have unevenness in the amount of light of exposure lamp **250** and variation in sensitivity for each pixel of CCD **301** amended (shading corrected). The digital image data subjected to a shading correction is sent to a reflectance→concentration conversion block **305**. In the case of a pre-scan operation for detecting the document size or for an ACS process (described afterwards), the data is sent to a histogram generation unit **311**. The process carried out by histogram generation unit **311** will be described afterwards.

Each image data (reflectance data) applied to reflectance→concentration conversion block **305** is converted into image data (concentration data) of r, g and b. Also, the data is subjected to a tone reproduction process such as highlight area enhancement and shadow area enhancement. Each process up to reflectance→concentration conversion block **305** is carried out in parallel for each image data of R, G, and B.

Each image data of r, g, and b (concentration data) output from reflectance→concentration conversion block **305** are applied to a color correction·UCR/BP process block **306**. Here, image data of the three colors of r, g and b are combined, whereby print data of Y, M, C and Bk are output. CPU **310** provides control of which color of print data is to be combined and output. CPU **310** is in synchronization with image recording unit **20**.

Print data of Y, M, C and Bk sequentially output from color correction UCR/BP process block **306** is subjected to an edit process such as trimming, if necessary, at an edit control block **307**. The data is then sent to a MTF correction block **308** to be subjected to the edge enhancement and smoothing processes. The data is further sent to a variable scale magnification-shift process block **309** to be subjected to a pixel density conversion process or pixel shift process in the direction of the main scan, or an repetitive output process of the same region (called "image repeat"), and then output to buffer memory **335**.

3. ACS Process

An ACS process carried out at histogram generation unit **311** will be described with reference to FIGS. **3**–**6**. An ACS process serves to identify whether the document set on glass platen **81** is a black-and-white document or a color document to determined the copy mode.

Identification of a black-and-white document/color document is made on the basis of whether the ratio of the number of chromatic dots Cn sampled from a document size region with respect to the total number of dots Sn sampled from the same region is smaller or not than a predetermined value SREF**7**-ϕ provided from CPU **310**. This identification is carried out by the following process.

A pre-scanning operation is initiated by image reader **80** in response to turning on start key **642** on the operation panel (FIG. **7**A) of the copy machine. Each image data R**37**-**3**ϕ, G**37**-**3**ϕ, B**37**-**3**ϕ of each read out R, G and B are sent to histogram generation unit **211**.

In histogram generation unit **311**, brightness data VH**7**-ϕ is generated by a brightness generation unit **311***a* from each of image data R**37**-**3**ϕ, G**37**-**3**ϕ, and B**37**-**3**ϕ of R, G and B. This brightness data VH**7**-ϕ is input as each address into a histogram memory **(1) 311***c* and a histogram memory **(2) 311***d*.

It is to be noted that brightness data VH**7**-ϕ applied as an address into each of histogram memories **311***c* and **311***d* is not the brightness for all the dots in the document size region, but the brightness of the dots specified by a sampling dot generation circuit **311***h*. In the present example, decimation of ⅛ and ¼ is effected in the main scanning direction and the sub-scanning direction, respectively, as shown in FIG. **4** taking into consideration the capacity of the memory. Accordingly, the capacity of 1M bit is sufficient in contrast to the requirement of the maximum capacity of 32M bits when all the dots are input in A**3**-size. Sampling dot generation circuit **311***h* carries out such decimation according to the sampling interval set value from CPU **310**. Also, the above sampling is made valid in the document size region according to signals HD and VD indicating the document size in the main scanning direction and the subscanning direction, respectively. Here, signals HD and VD indicating the document size are generated as shown in FIG. **6** by detecting the background level of the document from a signal obtained by pre-scanning according to the conventionally well known method. Signals HD and VD are applied to sampling dot generation circuit **311***h*. In the drawing, TG indicates a main scanning synchronizing signal, and VCLK is a synchronizing clock of the image data.

Brightness data VH**7**-ϕ is applied to histogram memory **(2) 311***d* only when the color is achromatic. Therefore, the minimum value Min (A, B, C) and maximum value Max (A, B, C) are obtained from each of image data R**37**-**3**ϕ, G**37**-**3**ϕ, and B**37**-**3**ϕ of R, G and B by a maximum-minimum calculation unit **311***e*. Then, the difference therebetween (a–b) is obtained by a difference calculation unit **311***f*. When this difference (a–b) is smaller than a predetermined value SREF**7**-ϕ from CPU **210** (P<Q), input to histogram memory **(2) 311***d* is effected. In other words, achromatic color is defined as described above taking advantage that the difference between the maximum value and the minimum value of the R, G and B image data is small.

The data of the input address in each of histogram memories **311***b* and **311***c* to which brightness data VH**7**-ϕ is applied is read out and added by "1", and then written into the relevant address. The operation of the histogram memory attains a read modify cycle with 8 dots as one cycle. Therefore, the address of histogram memories **311***b* and **311***c* indicates the gray scale level. The data stored in each address indicates the frequency (numbers) of the gray scale level corresponding to the relevant address.

Upon completion of the pre-scanning operation, CPU **310** reads out the frequency data for each gray scale from histogram memories **311***c* and **311***d*. The read out data is sent to CPU **410**. The ACS determination process of step S**123** in FIG. **10** is carried out according to the frequency data. Following read out of frequency data, 00000 is written into the address of all gray scale levels 0–255 in histogram memories **311***c* and **311***d*.

In the ACS determination process, the frequency (h**2**(n)) corresponding to histogram **2** is subtracted from each frequency (h**1**(n)) of histogram **1** to be set as histogram **3** (h**3**(n)). This histogram **3**(h**3**(n)) corresponds to the chromatic color area of the document. Then, the sum of the frequency in the gray scale range of b_2–b_1 out of histogram **3** (h**3**(n)) is obtained and substituted into Cn (refer to FIG. **5**). Cn is a variable indicating the number of dots in the color region. The number of dots in the gray scale range of

0–255=total sum is obtained out of each frequency (h1(n)) of histogram **1** and substituted into Sn. Sn is the sum of the total frequency of histogram **1**=the total number of pixels in the document. In FIG. **5**, Wn is the number of dots in the background (white) region of the document, Mn the number of dots in the halftone (gray) region of black-and-white in the document, and Bn is the number of dots in the black region in the document.

Upon obtaining Cn and Sn, the ratio Cn/Sn is compared with a certain threshold value. When the ratio is equal to or smaller than the threshold value, determination is made of a black-and-white document, so that the black-and-white copy mode is selected. When the ratio is greater than the threshold value, determination is made of a color document, and the full color copy mode is selected. By employing Sn as the denominator, the effect of the document size can be neglected. It is assumed that an appropriate value for the above "certain threshold value" is maintained in CPU **41**.

4. Cost Calculation

Cost calculation will be described hereinafter with reference to FIGS. **7A–10**. Cost calculation is based on the type of document corresponding to the defined document size (large/small) and ACS determination result (black-and-white/color), and the number of documents for each type.

A counter (color small, color large, black-and-white small, black-and-white large) **150** that corresponds to each type of document determined by the combination of the document size (large/small) and the ACS determination result (black-and-white/color) is connected to CPU **410** (refer to FIG. **7**B) that provides the overall control of the copy machine. The count value of the counter corresponding to each type of document is incremented every time a relevant document is read by a pre-scanning operation. When the pre-scanning operation for all the documents is completed, the corresponding unit cost is multiplied by the count value of each counter and the total sum thereof obtained. The total sum is displayed as shown in FIG. **8**C on a liquid crystal panel **421** in operation panel **640**. The user can identify the cost of a desired copy job beforehand to decide whether to modify the job or to initiate the intact copy job.

The display shown in FIG. **8**A is initially provided on liquid crystal panel **421**. Depression of "cost calculation" button causes a message to be displayed that promotes document setting and depression of start key **642**. Upon setting the document on document tray **3** and turning on start key **642**, the pre-scanning operation is initiated to identify the type of each document (color small, color large, black-and-white small, black-and-white large). The relevant counter is incremented and the above-described calculation is effected when the pre-scanning operation for all the documents is completed. As a result, the display as shown in FIG. **8**C is provided.

The cost calculation process will be described according to the flowcharts of FIGS. **9** and **10**.

In response to the power being turning on, initialization such as RAM clear is effected (**S101**). Then, a loop process is initiated that repeatedly executes the processes of steps **S103**-**S106** for every period of time (**S107**; YES) under control of an internal timer (**S102**).

In the key reception process (**S103**), entry of the key switch in operation panel **640** and the button switch on liquid crystal panel **421** is accepted. The ACS process is carried out when the ACS mode is selected by operating ACS key **644** on operation panel **640** (or by default). The full color mode or the black-and-white mode can be forcefully set via the full color key or black-and-white key **643**.

The cost calculation process (**S104**) will be described in detail with reference to FIG. **10**.

The copy operation process (**S105**) is directed to execute a copy operation sequence. When "cost calculation" is selected at the initial screen of FIG. **8**A, the rate is displayed according to the cost calculation process, and a copy operation process is executed after confirmation is made of the indicated cost. When "start copy" is selected at the initial screen of FIG. **8**A, a copy operation process is immediately executed by turning on start key **642**.

The miscellaneous process (**S106**) is directed generically to processes not included in the above steps **S103**–**S105**, such as communication with CPU **210**.

Initially, state S is **0** (refer to **S110**). When start key **642** is turned on (YES at step **S111**), control proceeds to **S112** to inhibit a copy operation. Then, control proceeds to **S113** to clear the memory area corresponding to the cost storage in RAM **102**. The control proceeds to **S114** where instruction is provided to automatic document feeder **2** to feed and set a document on glass platen **31**. Then, state S is set to **1** (**S115**).

When state S attains **1** control proceeds to step **S121** to wait for a document to be set at a predetermined position on glass platen **31**. When a document is set at a predetermined position (**S121**; YES), the document is scanned as described before to detect the document size (**S122**). Also, the ACS determination process is carried out according to the scanning result (**S123**). When the type of the document (color small, color large, black-and-white small, black-and-white large) is determined, the counter corresponding to the relevant type is incremented (**S124**). Then, an instruction is provided to automatic feeder device **2** to discharge the document to discharge tray **10**. Then, state S is set to **2** (**S126**).

When state S attains **2**, control proceeds to step **S131** where determination is made of the presence of a document on document tray **3** by automatic document feeder **2**. When there is a subsequent document (**S131**; NO), an instruction is provided to automatic document feeder **2** to feed and set the next document on glass platen **31**. State S is returned to **1**. Then, the above process of steps **S122**–**S125** is carried out on the next document.

When the process of steps **S122**–**S125** is completed for all the documents in document tray **3** (**S131**; YES), control proceeds to step **S132** to calculate the printing cost. As described above, the unit cost determined for each type of document is multiplied by the number of sheets of the relevant type (count value). The total sum thereof is obtained. The value corresponding to the number of multi-copies is to be further multiplied in the case of multi-copy. The obtained rate is displayed on liquid crystal panel **421** (**S134**) as shown in FIG. **8**C. Then, state S is set to **3** (**S135**).

When state S attains **3**, control proceeds to step **S141** where determination is made whether the print job is to be altered or not. Here, the depression of "YES" button or "OK" button shown in FIG. **8**C is expected. When the "NO" button is entered (**S141**; YES), the image memory is cleared since the indicated rate is not acceptable. Accordingly, a copy mode differing from the former mode can be set. In other words, the job can be altered. A process similar to that described above is carried out for the modified job, and the cost corresponding to the modified job is displayed.

When the "OK" button is depressed (**S141**; NO), the copy operation is initiated (**S143**) since the rate on the display is accepted. According to the flow chart of the present embodiment, the main scanning operation is carried out subsequent to the pre-scanning operation, so that the process

corresponding to the case where image data is already stored in the image memory is shown. Therefore, the copy operation is described as to be immediately initiated according to the image data. Alternatively, a structure can be provided to set the copy mode at this current stage (at the time point of NO at step S**141**) and prompt resetting of a document. The main scanning operation is executed for the document set again. Then, a print out operation thereof can be initiated. Also, a structure can be provided in which the image data is stored at the main scanning operation subsequent to the pre-scanning, and set only the copy machine mode at this time point. In other words, a structure that permits a copy operation upon depression of "OK" button is provided. Furthermore, a structure can be provided to carry out a process similar to that when the "OK" button is depressed in the event that the "NO" button is not depressed at an elapse of a predetermined period of time after display of the print out cost is provided.

Second Embodiment

A second embodiment of the present invention will be described hereinafter.

Referring to FIG. **11**, a printing system **1** of the second embodiment has user side data processors **5***a*, **5***b*, and **5***c*, a center side data processor **4**, and copy machines **3***a* and **3***b* connected by a communication line **6**. The number of user side data processors **5***a*, **5***b*, **5***c* and copy machines **3***a*, **3***b* is arbitrary, and not limited to the number of the present embodiment.

User side data processors **5***a*, **5***b* and **5***c* are installed at the home of different users. Center side data processor **4** is installed at the data management center that handles in a centralized manner various types of data sent from each user. Copy machines **3***a* and **3***b* are installed at respective convenience stores located at different sites. In another embodiment, user side data processors **5***a*, **5***b*, and **5***c* are installed at different rooms in the same facility, and center side data processor **4** and copy machines **3***a* and **3***b* are installed at the same room in the same facility. It is also possible to install all or some of user side data processors **5***a*, **5***b*, **5***c*, center side data processor **4**, and copy machines **3***a*, **3***b* in the same room. Communication line **6** may be, for example, a public analog line, digital line, private line, or a network such as LAN, WAN, and Internet.

Printing system **1** is directed to allow print out of the contents of an image file from any of copy machines **3***a* and **3***b* by having the user set in a readable manner the image file in which image data to be printed is stored and entering or setting the required items through any of user side data processors **5***a*, **5***b* and **5***c*.

In the second embodiment, an image file is a generic term of a file in which image data of various formats or of a compressed format is stored, a text file in which text data is stored, and the like. Copy machines **3***a* and **3***b* are digital color copy machines respectively including an image reader and a printer. The printer thereof is used to print out the image file. Details will be described afterwards.

Each of user side data processors **5***a*, **5***b*, and **5***c*, and copy machines **3***a* and **3***b* have a similar structure and function. Therefore, only one thereof will be described hereinafter. In the following, "user side data processor **5**" and "copy machine **3**" refer to all or some of user side data processors **5***a*, **5***b*, **5***c*, and copy machines **3***a* and **3***b*, respectively.

FIG. **12** is a block diagram showing the structure of user side data processor **5**, center side data processor **4**, and copy machine **3**.

Referring to FIG. **12**, user side data processor **5** includes a main unit **50**, a display **51**, a keyboard **52**, and a mouse **53**. A personal computer or a workstation is employed as user side data processor **5**. An appropriate program is installed therein.

Main unit **50** includes a hard disk **54**, a drive device **55** for the floppy disk, a drive device **56** for a CD-ROM, a slot **57** for an IC card, a memory **58**, and a processor unit **59**.

Drive device **55** accesses a storage medium MM**1** that is an externally set floppy disk for data reading and writing. A drive device **56** accesses a storage medium MM**3** which is a CD-ROM to read in the data thereof. Slot **57** is provided for reading and writing data of a storage medium MM**2** such as an IC card.

A program AP for carrying out the process in user side data processor **5** to implement printing system **1**, an image file (image data) DF to be printed, image print information PD required for printing out image file DF, and other programs and data are stored in hard disk **54**. These programs or data can be partially stored in memory **58**. The program and data stored in hard disk **54** can be loaded appropriately to the main memory.

As shown on the screen of display **51**, image print information PD includes image file DF, data code DC, reservation data RD, output site PS, payment form FM, ID code UC, print condition PC, and the like. Image file DF displayed on the screen of display **51** is the file name.

Image print information PD is entered by the user through keyboard **52** or mouse **53** according to the screen on display **51**. The user enters the aforementioned items for image file DF that he/she wishes to print out. At this stage, a plurality of image files DF can be input. In other words, the printout of a plurality of image files DF can be specified by one image print information PD. Data code DC is specified by the user for each image file DF. It is to be noted that ID code UC is not entered by the user, but transmitted from center side data processor **4** in response to sending image print information PD to center side data processor **4**. The details of data code DC and ID code UC will be described afterwards.

The information of image print information PD other than ID code UC is stored in hard disk **54** or memory **58** when entered through user side data processor **5**. This information is transmitted to center side data processor **4** through communication line **6**. In the present specification, "image print information PD" refers to the entire image print information PD, or some of the information thereof, particularly information excluding ID code UC.

According to the currently available electronic system such as electronic money or electronic banking, the payment of the cost for printing out image file TF can be settled through user side data processor **5**.

In processor unit **59**, program AP stored in hard disk **54** is executed to carry out various processes that will be described afterwards.

Center side data processor **4** is a personal computer or a workstation, for example, similar to user side data processor **5**. A program BP for implementing printing system **1** through the processes of center side data processor **4**, image print information PD sent from user side data processor **5**, ID code UC generated at center side data processor **4**, and the like are stored in memory device **41** such as a hard disk or memory provided in the main unit of center side data processor **4**.

In processor unit **49**, program BP is executed to carry out various processes such as sending image print information

PD to copy machine **3**, comparing data code DC and ID code UC sent from copy machine **3** with relevant codes stored in memory device **41**, and the like. Copy machine **3**, which is a digital color copy machine includes both the function as a copier for reading out the image on a document and reproducing an image thereof, and a printer device for receiving an image file (image data) output from an external apparatus such as center side data processor **4** to reproduce an image corresponding to the contents of the image file. Copy machine **3** includes an interface and a communication control device for connection with communication line **6**.

Copy machine **3** includes an operation panel **18**, a control unit **100**, and a storage medium reader device **39**. Control unit **100** is provided with a memory **131** such as a hard disk or a semiconductor memory. A program CP for providing control of the printer, data code DC and ID code UC entered through operation panel **18** or read out from storage medium MM**1**, **2** by a storage medium reader device **39**, image file DF sent from center side data processor **4**, and some of image print information PD are stored in memory **131**.

By setting storage medium MM**1**, **2**, storage medium reader device **39** reads out data code DC and ID code UC stored therein for input. The details will be described afterwards.

Referring to FIG. **13**, a copy machine **3** includes an image reader **10** for reading out the image of a document, a printer **20** for receiving the image read out by image reader **10** or image signals of an image file output from an external apparatus for reproducing an image corresponding to the image file, and a vendor apparatus **200** used for payment of the printing cost.

Image reader **10** includes a scanner **11**, a document glass panel **16**, a document cover **19**, an operation panel **18** and the like. Operation panel **18** is provided at the front face or top face of image reader **10**.

Scanner **11** includes an exposure lamp **12** for irradiating a document, a rod lens array **13** for collecting light reflected from the document, and a contact type CCD color image sensor for converting the light collected by rod lens array **13** into electrical signals (referred to as "CCD sensor" hereinafter) **14**.

FIG. **14** is a top view of image reader **10** with document cover **19** open. Document cover **19** can attain an open/closed state with one side as an axis. By closing document cover **19**, the document mounted on document glass panel **16** is secured during scanning. Also, document cover. **19** prevents the light of exposure lamp **12** from spreading outwards.

Exposure lamp **12** and CCD sensor **14** parallel to each other and having a length substantially equal to the width of document glass panel **16** are provided in a direction orthogonal to the direction of arrow M**2** (the subscanning direction) in FIG. **14**. A white reference plate **17** used for shading correction is provided at the left side of document glass panel **16**.

Referring to FIG. **13** again, scanner **11** is driven by motor **15** to move in the direction of arrow M**1** in the reading operation of a document. A total of four scans are carried out corresponding to each color of yellow Y, magenta M, cyan C and black K for one document mounted on document glass panel **16**. CCD sensor **14** is provided with filters (not shown) of red R, green G and blue B to carry reading of three colors at the same time in one scan.

The image on the face of the document irradiated with exposure lamp **12** of scanner **11** is photoelectrically converted by CCD sensor **14** to be provided to control unit **100** as multi-value electric signals of red R, green G and blue B.

When copy machine **3** is used as a printer, the signals of image file DF sent from an external apparatus is received by control unit **100** as multi-value electric signals of red, green, and blue.

The multi-value electric signals in control unit **100** are converted into concentration data of yellow Y, magenta M, cyan C and black K by image signal processor **120** (refer to FIG. **17**) to obtain an optimum reproduced image.

Each density data is subjected to a correction (γ correction) according to the tone characteristic of the photoconductor and a dither process in printer control unit **130** (refer to FIG. **17**) of control unit **100** to be provided as an output control signal to a print head unit **21** incorporating a laser diode. Print head unit **21** emits a laser beam of an intensity corresponding to each concentration data according to the output control signal. The surface of photoconductor drum **22** is exposed for each color of reproduction.

Prior to this exposure, the surface of photoconductor drum **22** has residue toner removed by a cleaner **23** and is further exposed by an eraser lamp **24** to be discharged. Then, the surface of photoconductor drum **22** is charged uniformly by a corona charger **25**. When the surface of photoconductor drum **22** is exposed at a uniformly charged state, an electrostatic latent image is formed on the surface of photoconductor drum **22**.

Toner developing unit **26** includes toner developing devices **26***a*–**26***d* of each color of magenta M, cyan C, yellow Y and black K. Toner developing unit **26** is driven vertically by an elevating device not shown in synchronization with the rotation of photoconductor drum **22**. One of toner developing devices **26***a*–**26***d* corresponding to the color component of the electrostatic latent image is selected to develop the image on the surface of photoconductor drum **22**.

Sheet size detection sensors **37** and **38** formed of a photoelectric sensor and the like are provided at sheet cassettes **32** and **33**, respectively. A print out sheet of a size specified by the user or from printer control unit **130** is fed out from sheet cassettes **32** and **33** according to the detection signal from sheet size detection sensors **37** and **38**. The sheet supplied from sheet cassettes **32** and **33** has its leading edge clamped by a chucking mechanism **34** on transfer drum **28** and electrostatically adsorbed by an adsorption charger **35** to be wound around transfer drum **28** in a state that eliminates position offset. The developed image on the surface of photoconductor drum **22** is transferred onto the sheet wound around transfer drum **28** by a transfer charger **27**.

This printing stroke is repeatedly carried out for each color of magenta M, cyan C, yellow Y and black K. When the printing is completed for all the colors, a disengage claw **29** is actuated, whereby the sheet is detached from the surface of transfer drum **28**.

The toner image transferred onto the sheet is unstable and will be easily peeled off when touched. Therefore, the sheet is pressed while being heated in fixation apparatus **30** to fix the toner between the fiber of the sheet. Then, the sheet is discharged on discharge tray **31**.

Referring to FIG. **15**, operation panel **18** includes a ten key **181**, a display **182** indicating permission of printing, a display **183** indicating the sheet size, a sheet select key **184** for selecting the sheet size, a display **185** indicating the number of copies or prints, a start key **186** for designating initiation of a copy or printing operation, a display **187** indicating the input mode for the data code and the ID code, and a code input key **188**.

Ten key **181** is used to enter the number of copies when copy machine **3** functions as a copy apparatus, and to input

the data code and the ID code corresponding to the user's code when functioning as a printer. Code input key **188** is used to set or cancel the mode for entering the data code and the IC code.

When the light of display **187** is turned off, copy machine **3** can be used as a copier. When the light of display **187** is turned on, copy machine **3** can be used as a printer. The code entered via ten key **181** is stored in memory **131** as the data code. The light of display **187** attains a blinking state when the data code is entered. The code entered through ten key **181** is stored in memory **131** as the ID code.

Referring to FIG. **13** again, vendor apparatus **200** includes a vendor control unit **210** and a vendor panel **120**. Vendor control unit **210** provides control of the operation of vendor apparatus **200**, and is connected to control unit **100** of copy machine **3**. Vendor panel **220** includes a coin inlet **222** through which a user inserts a coin for the payment of a printing cost, and a display **221** providing the balance of the inserted coins.

Control unit **100** will be described hereinafter with reference to FIG. **17**.

Control unit **100** includes an image reader control unit **110**, an image signal processing unit **120**, a printer control unit **130**, and a clock IC **140**.

Image reader control unit **110** provides the control of each operation of image reader unit **10** in reading out a document. More specifically, CCD sensor **14** is driven and the ON/OFF of exposure lamp **12** is controlled. Motor **15** is driven to control the scanning operation of scanner **11**.

Image signal processing unit **120** processes the image signals of red R, green G and blue B from CCD sensor **14** of scanner **11** to convert the same into image data of the colors of magenta M, cyan C, yellow Y and black K to obtain the optimum reproduced image.

Printer control unit **130** is directed to control the operation of each component in printer unit **20**. The image data output from image signal processing unit **120** is subjected to γ correction, and then to a dither process when a multi-value dither method is employed as a tone reproduction method. The output of print head unit **21** is controlled. Also, overall control is provided under synchronization of various operations such as sheet supply from sheet cassettes **32** and **33**, rotation of photoconductor drum **22** and transfer drum **28**, elevation of toner developing unit **26**, and charge supply to each charger.

Image print information PD will be described in detail with reference to FIGS. **18** and **19**.

As shown in FIG. **18**, image print information PD1 includes data code DC, date of reception JT, date of transmission ST, reservation date RD, payment form FM, image file DF, presence/absence of reservation RI, time before erasure ET, ID code UC, and print condition PC.

Data code DC serves to identify respective image files DF of each user. In general, the user assigns a comprehensible unique code as data code DC for each image file DF. As to the image files DF handled by the user himself/herself, the data code DC differs for each different image file DF. However, in the relationship with data code DC of another user, there is a possibility that the same data code DC may be assigned independent of the same or different image file DF. Although alphanumerics are used for data code DC, kanji, katakana, and hiragana characters can also be used. In the present embodiment, only numerics that can be entered through ten key **181** is used. It is to be noted that a data code DC may be identical to the file name of an image file DF. It is therefore possible to use a file name instead of a data code DC. The data code is sometimes called the "user code".

Data code DC is data that may be known to other users. When a list of data codes DC is provided on the display in copy machine **3**, each user can easily select his/her own data code DC that is to be printed from the displayed list. In such a case, ID code UC that will be described next must be entered in addition to data code DC to actually print out an image.

ID code UC is a code assigned to each user, and must not be known to other users. In the present embodiment, each image print information PD transmitted to center side data processor **4** is assumed to correspond to one user. One ID code UC is assigned for every one transmitted image print information PD. It is also possible to assume that one image file DF corresponds to one user.

More specifically, when image print information PD is sent from user side data processor **5** to center side data processor **4**, one ID code UC is automatically generated for the sent image print information PD at center side data processor **4**. The generated ID code UC is stored at center side data processor **4** as a part of image print information PD, and sent to user side data processor **5**.

One image print information PD includes one or a plurality of data codes DC, i.e. one or a plurality of image files DF that is to be printed out. Even in the case where there are a plurality of data codes DC (image files DF), one ID code UC corresponds to one image print information PD.

The user enters the ID code UC corresponding to the designated image print information PD at copy machine **3**, whereby printout of image file DF specified by image print information PD can be carried out by copy machine **3**. In other words, ID code UC includes the security feature to prevent a specified image file DF from being printed out by another user.

Alphanumerics, kanji, katakana, and hiragana characters can be used as ID code UC. In the present embodiment, only numerics are used so that an ID code UC can be entered through ten key **181**.

Referring to FIG. **19**, when three image files DF of "A", "B" and "C" are specified by one image print information PD, one ID code UC "1234" is generated. The generated ID code UC is assigned to the relevant user. Here, the same ID code UC "1234" corresponds to any of data codes DC of "111", "222" and "333".

The user has to be aware of his/her own input data code DC and corresponding ID code UC. Note can be taken of these codes displayed on the screen of display **51**, or recorded in storage medium MM1, **2** as in the present embodiment. The recorded storage medium MM1, **2** can be set in storage medium reader device **39** of copy machine **3**, so that data code DC and ID code UC can be directly entered from storage medium MM1, **2** to copy machine **1**.

Therefore, the trouble for the user remembering or noting down data code DC and ID code UC is eliminated. Also, the user does not have to use operation panel **18** to enter the codes in copy machine **3**. This prevents the entry of a wrong code due to remembering a wrong number or by erroneous input. The proper data code DC and ID code UC can always be entered.

Print condition PC is the condition of various printing forms required for the printout in reproducing image file DF by copy machine **3**.

FIG. **20** shows various items of print condition PC. Print condition PC includes the number of prints, the output color

(monocolor/color), duplex output (two-side/one-side), staple (designated/not designated), punch (designated/not designated), the sheet size, picture quality, and the like.

Each of the items is set by the user to a desired value or form at user side data processor **5** to be stored as patterns "a"–"f". This print condition PC pattern is assigned by the user for image file DF to be printed out. For example, image file A is printed out under the print condition pattern of "a", and image file F is printed out under the print condition of pattern of "f".

When print condition PC is set and assigned for image file DF, printing cost OF of image file DF under print condition PC is calculated by center side data processor **4** or copy machine **3** to be provided to user side data processor **5** on display **51**.

Since print condition PC can be set at user side data processor **5**, it is not necessary to set print condition PC manually at copy machine **3**. Therefore, the trouble of manipulation or time required by erroneous operation for a user unfamiliar with the manipulation of copy machine **3** can be reduced.

Since the user can identify printing cost OF in advance before print out is executed by copy machine **3**, print condition PC can be altered when the expense for print out is too high. Furthermore, the problem of insufficient amount for payment can be prevented in the event of paying printing cost OF at the installed site of copy machine **3**.

Referring to FIG. **18** again, date of reception JT is the date of receiving image print information PD at center side data processor **4**. The year, month, day, and time are automatically recorded by an internal clock in center side data processor **4**. Date of transmission ST is the date of transmission of image file DF to copy machine **3**. Reservation date RD is the year, month, day and time for printing to be carried out at the designated date. When only the year, month, and day are specified for the reservation date RD without the specific time, determination is made that printing during the nighttime is specified.

Payment form FM is to designate the form of payment of printing cost PF. Specific payment such as "prepayment", "post payment" and "remittance" are recorded. "Prepayment" or "remittance" indicates that the cost required for printing is already paid in transmitting image print information PD from user side data processor **5** to center side data processor **4**. Various methods of payment by data communication called electronic money, electronic banking, electronic settlement, or deposit from a predetermined bank account can be employed. In the case of "prepayment", the charge corresponding to the relevant printout is deposited from a prepaid amount at the time point an ID code UC is assigned in response to transmission of image print information PD to center side data processor **4**. "Remittance" corresponds to the case where a remittance of the amount for the print out of an image file DF is made.

By this prepayment or settlement, there is an advantage that the period of time of retaining image print information PD at center side data processor **4** is expanded. It is therefore desirable for the user to settle the cost by prepayment or transaction to avoid the trouble of resending image print information PD in the case where execution of printout by copy machine **3** might be deferred. "Post payment" corresponds to the case where the payment is settled by inserting a coin into coin inlet **222** in real-time execution of printout by copy machine **3**.

Image file DF contains image data that is generally of an amount significantly greater than other data. Therefore, only the file name may be recorded and the actual data stored separately. When image file DF is erased, "erased" is recorded. Reservation RI is recorded according to the setting of reservation date RD by "designated" or "not designated". Time until erasure ET indicates the time (minutes) before image print information PD stored in storage device **41** is to be erased.

The process carried out by print system **1** will be described with reference to FIGS. **21–24**.

FIG. **21** shows the sequence of a first specific example of print system **1** of the second embodiment, related to calculation and display of printing cost OF. Referring to FIG. **21**, the user operates user side data processor **5** to transmit image file DF to be printed out and image print information PD including print condition PC to center side data processor **4** (S21). Thus, a printing request is sent to center side data processor **4**.

Upon receiving image print information PD, center side data processor **4** sends image file DF and print condition PC to copy machine **3** (S22, S23).

Printing cost PF corresponding to the printout of image file DF according to print condition PC at copy machine **3** is calculated. The calculated printing cost PF is sent from copy machine **3** to center side data processor **4** (S24). Printing cost PF is further transmitted from center side data processor **4** to user side data processor **5** to be provided on display **51** (S25).

If the user is satisfied with the printing cost PF indicated on display **51**, the user goes to the installed site of copy machine **3** to obtain the print out of image file DF. Specific processes up to obtaining the print out of image file DF will be described afterwards according to the sequence diagram of FIG. **24**.

When a print out according to print condition PC specified by the user cannot be achieved out due to copy machine **3** lacking the relevant function, printing cost PF is not calculated, and output unfeasible information NP is sent from copy machine **3** to center side data processor **4** (S27).

Printer information PI is sent from center side data processor **4** to user side data processor **5** to be provided on display **51** (S26). Print information PI provides information of details of the ability of copy machine **3** and printing cost PF in carrying out printing with respect to copy machine **3** that can print out image file DF according to print condition PC.

Referring to FIG. **23**, printer information PI includes the unit cost, machine name, installed site of copy machine **3** in addition to the range and form that can be set for each item of print condition PC shown in FIG. **10**.

The user selects a copy machine **3** that satisfies the desired print condition PC from print information PI to obtain a printed output under the desired print condition PC.

FIG. **22** shows a second specific example of printing system **1** of the second embodiment.

Similar to the first specific example, the user operates user side data processor **5** to transmit image file DF to be printed and image print information PD including print condition PC to center side data processor **4** (S31).

At center side data processor **4**, printing cost PF corresponding to execution of printing image file TF according to print condition PC is calculated. The calculated printing cost PF is sent from center side data processor **4** to user side data processor **5** to be provided on display **51** (S32).

A structure can be provided in which a copy machine **3** that can print out according to print condition PC requested

by the user out from the plurality of copy machines **3** connected to center side data processor **4** can be searched for by a process at center side data processor **4**, and have the printing cost PF for the identified copy machine **3** provided on display **51**. In this case, the user can select a copy machine **3** corresponding to the lowest charge.

The specific process of obtaining a printed output of image file DF by copy machine **3** will be described hereinafter with reference to FIG. **24**.

The sequence of FIG. **24** is the process omitted from the sequences of FIGS. **21** and **22**, particularly directed to the process or manipulation of executing printing. The sequence of FIG. **24** is applicable to both the first and second specific examples of FIGS. **21** and **22**.

The user operates user side data processor **5** to transmit image print information PD of interest to center side data processor **4** (S1). Accordingly, a printout is requested to center side data processor **4**. At this stage, the fee of printing can be remitted or settled with respect to center side data processor **4** electronically.

Upon receiving image print information PD, center side data processor **4** generates a different ID code UC for every user, i.e., for every image print information PD. The generated ID code UC is transmitted to the corresponding user side data processor **5** (S2). At user side data processor **5**, the received ID code UC is displayed on the screen of display **51**. The user records the received ID code UC into recording medium MM1, **2**. The user must remember or note down ID code UC provided on the display screen when recording medium MM1, **2** is absent.

In addition to transmission of ID code UC, center side data processor **4** sends information indicating retention of image file DF (image retention information) together with data code DC to copy machine **3** of interest. At this stage, information of the reservation date RD and payment form FM is sent (S3). The transmitted information is stored in memory **131** of copy machine **3**.

At the same time, the measurement of time is initiated to obtain the timing of erasing the set of the received image print information PD (S4). At the elapse of a certain time, image file DF corresponding to ID code UC is erased. Information indicating that data code DC and image file DF are discarded is sent to copy machine **3** of interest (S13).

Upon transmitting image print information PD from user side data processor **5**, the user takes storage medium MM1, **2** in which the received corresponding ID code UC is recorded and goes to a certain site, for example, to a convenience store where the designated copy machine **3** is installed.

The user operates operation panel **18** of that copy machine **3**, and sets storage medium MM1, **2** in storage medium reader device **39** to enter data code DC and ID code UC which is the user code (S5). In the case of absence of storage medium MM1, **2**, data code DC and ID code UC are entered manually via operation panel **18**.

Following entry of the user code, a check is made whether the input data code DC is present in the DC codes DC stored in memory **131**. When there is a match, information requesting image file DF (image request) is sent together with ID code UC to center side data processor **4**.

Upon receiving the image request, center side data processor **4** compares the received ID code UC with ID code UC stored in memory device **41** to determine whether there is a match or not (S8). When the received ID code UC and corresponding data code DC match, the corresponding image file DF, information of whether payment of the copy fee is settled or not, and data code DC are transmitted to copy machine **3** (S7).

In other words, printing is allowed only when the ID code UC previously transmitted to user side data processor **5** matches ID code UC entered by the user through copy machine **3**. Printing cannot be effected when the code does not match. This prevents erroneous printout of image file DF and an unqualified printout of image file DF by another person.

Upon depression of start key **186** on operation panel **18**, copy machine **3** initiates the printing out operation of the specified image file DF (S9). The user must settle the payment by transferring an amount into a predetermined bank account or by inserting a coin into coin inlet **222** of vendor device **200**.

When the printing operation is completed normally at copy machine **3** (S11), data erasure designation information is sent together with data code DC from copy machine **3** to center side data processor **4** (S12). Upon receiving data erasure designation information, center side data processor **4** erases image print information PD corresponding to that data code DC from memory device **41**. Therefore, the usability of memory device **41** is improved.

When the printing operation is interrupted at copy machine **3** due to some cause such as shortage of a recording sheet, data retention designation information is transmitted from copy machine **3** to center side data processor **4** (S10). Upon receiving data retention designation information, center side data processor **4** temporarily suppresses the time count of erasing the corresponding image print information PD, or prolongs the count time.

When the time elapses, image print information PD stored in memory device **41** of center side data processor **4** is forcefully erased even when printing of image file DF has not been carried out by copy machine **3**.

There is a case of requesting print out during night when copy machine **3** is not frequently used and when the electric charges is low. Nighttime is often specified for reservation date RD. When there is no specification of the time for reservation date RD, automatic printing at the time of entering the nighttime period is designated (S14).

In the case of automatic print designation, automatic print designation information is sent together with data code DC and image file DF from center side data processor **4** to copy machine **3** (S15). Upon receiving automatic print designation information, copy machine **3** executes printing of the corresponding image file DF. Information such as data code DC can be automatically added to the print out. In this case, the printed out sheet can be sequentially delivered to the relevant user for exchange of the expense. When the cost is already paid, the user can obtain the printout by indicating data code DC and ID code UC.

The process operation of printing system **1** of the first and second embodiments will be described hereinafter with reference to flowcharts.

FIG. **25** is a flow chart showing the overall process of center side data processor **4**. Center side data processor **4** receives data from user side data processor **5** and copy machine **3** (#200). Then, the cost data process (#220) for calculating the cost required for printing image file DF according to print condition PC (#220) is carried out. These processes are executed by program BP stored in memory device **41** of center side data processor **4**.

FIG. **26** is a flow chart showing the contents of the reception process.

When image print information PD is received from user side data processor **5** (#**202**; YES), control proceeds to #**204** to store the received image print information PD together with the date of reception JT. Also, ID code UC is generated and sent to user side data processor **5** (#**204**). Then, image retention information indicating retention of image file DF is sent to copy machine **3** together with data code DC (#**206**). Accordingly, the received data code DC is stored in memory **131** at copy machine **3**. At the same time, a timer TM (N) for obtaining the timing to erase the stored image print information PD is set for each user to initiate time counting (#**208**).

When image file DF is requested from copy machine **3** (#**210**; YES), a check is made whether an ID code UC identical to ID code UC that is requested is stored in memory device **41** (#**212**). If there is a match, the corresponding image file DF, cost payment information, and data code DC are sent to copy machine **3** (#**214**).

FIG. **27** is a flow chart showing the cost data process of a first specific example.

When image file DF from user side data processor **5** and image print information PD including print condition PC are received (#**226**; YES), the received image file DF is transmitted to copy machine **3** (#**227**). Then, print condition PC is sent to copy machine **3** (#**228**). Upon receiving printing cost PF calculated at copy machine **3** (#**229**; YES), printing cost PF is transmitted to user side data processor **5** (#**230**). Printer information PI from copy machine **3** is sent to user side data processor **5** (#**232**).

FIG. **28** is a flow chart showing the cost data process of a second specific example.

When image file DF from user side data processor **5** and image print information PD including print condition PC are received (#**242**; YES), the cost calculation process is carried out (#**244**). The calculated result is sent to user side data processor **5** (#**246**). When the cost calculation process for all the copy machines that allow printout according to print condition PC is completed (#**248**; YES), the main routine ends.

FIG. **29** is a flow chart showing the contents of the cost calculation process of step #**244** of FIG. **28**.

Referring to FIG. **29**, the total amount of printing cost PF is initialized to **0** (#**252**). The print unit cost which is the printing cost PF per sheet is initialized to **0** (#**254**). Then, a size unit cost process which is the calculation of the unit cost for a sheet size is carried out according to print condition PC designated by the user (#**256**). A sheet type process which is the unit cost calculation according to the type of the sheet is carried out (#**258**). Then, an output color process which is the unit cost calculation of a sheet according to the output colors is carried out (#**260**). Respective values are totaled to calculate printing cost PF (#**262**). When the calculation of printing cost PF for all image files PF is, completed (#**264**; YES), the main routine ends.

FIGS. **30**, **31**, and **32** are flow charts corresponding to steps #**256**, #**258**, #**260**, respectively, of FIG. **29**.

According to the flow chart of FIG. **30**, when the sheet size specified by the user is A**3** (#**272**; YES), the print unit cost is set to, for example, 20 Japanese yen (#**277**). When the sheet size specified by the user is A**4**, B**4**, or B**5** (YES in any of steps #**273**–#**275**), the print unit cost is set to, for example, 10 yen (#**278**). When the sheet size specified by the user does not correspond to any of these sizes (NO in all steps #**272**–#**275**), output unfeasible information is set (#**276**).

According to the flow chart of FIG. **31**, when the type of the sheet specified by the user is a normal sheet (#**282**; YES), the main routine ends. When the type of the sheet specified by the user is a cardboard (#**284**; YES), 20 yen, for example, is added to the unit cost (#**286**). When the type of the sheet specified by the user is a color sheet (#**285**; YES), 10 yen, for example, is added to the unit cost (#**287**). When the type of the sheet designated by the user is none of the above-mentioned type of sheets, (NO in all #**282**–#**285**), output unfeasible information NP is set (#**288**).

According to the flow chart of FIG. **32**, when the output color specified by the user is monochromatic (#**292**;. YES), the main routine ends. In the case of monocolor (#**294**; YES), 20 yen, for example, is added to the unit cost (#**296**). When neither applies (#**292** and #**294**; NO), 40 yen, for example, is added to the unit cost (#**298**).

FIG. **33** is a flow chart showing the overall process of copy machine **3** according to a first specific example. The flowchart without the copy cost process of step #**720** of FIG. **33** corresponds to the flow chart indicating the overall process of copy machine **3** of a second specific example.

Referring to FIG. **33**, when copy machine **3** is powered on, initialization is carried out to set the timer defining the time of one routine (#**500**). Control proceeds to #**600** to carry out an image request process of requesting image file DF to center side data processor **4**. Control proceeds to #**700** to carry out a data erasure process of discarding the received image file DF. Control proceeds to #**720** to carry out a copy cost process for calculating the expense of printing out image file DF. Control proceeds to step #**800** to carry out the print process of receiving image file DF from center side data processor **4** and printing out the received image file DF. Then, control proceeds to #**900** to carry out miscellaneous processes. When a predetermined time elapses (#**999**; YES), control returns to step #**600**.

FIGS. **34**, **35** and **41** are flow charts showing the image request process, the data erasure process, and the print process, respectively. The flowcharts of the FIGS. **34**, **35** and **41** are applicable to both the first and second specific examples.

These processes are carried out by executing program CP stored in memory **131** of copy machine **3**.

According to the flow chart of FIG. **34**, determination is made whether code input key **188** on operation panel **18** is depressed or not (#**602**). The light of display **187** is alternately turned on and off every time code input key **188** is depressed (#**604**, **606**, **608**). The mode of entering the user code, i.e., data code DC and ID code UC, is entered when the light of display **187** is ON.

When there is an input through ten key **181** (#**610**; YES), control proceeds to #**612**. When the light of display **187** is on (YES), control proceeds to #**614** to store the input series of numbers into memory **131** as data code DC. The entered data code DC is checked. When there is a matching data code DC (#**616**; YES), the light of display **187** attains a blinking state (#**618**).

When there is an entry through ten key **181** during the blinking state of display **187** (#**610**; YES: #**612**; NO: #**620**; YES), the entered series of numerics is stored into memory **131** as ID code UC (#**622**). Then, control proceeds to #**624** to transmit the image request to center side data processor **4**. Then, the light of display **187** is turned off (#**626**).

When detection is made that recording medium MM**1**, **2** is set at storage medium reader device **39** (#**628**), data code DC and ID code UC are loaded from storage medium MM**1**, **2** (#**630**). The loaded data code DC is checked to see whether there is a matching data code DC (#**632**; YES). Then, control proceeds to #**634** to send an image request to center side data processor **4**.

Referring to FIG. **35**, determination is made whether data discard information is received from center side data processor **4** (#**702**). When data discard information is received, data code DC stored in memory **131** is deleted from copy machine **3** (#**710**) based on the assumption that printing is no longer intended since printing was not executed within a predetermined time or period (for example, several days) despite the user once requesting printout. Then, image file DF corresponding to data code DC, if held in memory **131**, is also deleted (#**714**).

When data discard information is not received at step #**702**, determination is made whether the complete printing operation by copy machine **3** is ended or not (#**704**). When the entire printing operation is completed, data code DC is deleted at step #**710**. When the printing operation has not yet been completed, control proceeds to #**706** to determine whether all the inserted coins are returned or not. Assumption is made that the printing has been interrupted prior to completing the entire printing when all the coins are returned. Control proceeds to #**712** to issue a data retention instruction to defer from erasing immediately image print information PD to center side data processor **4**.

When the coin return operation is not effected at step #**706**, control proceeds to #**708** to determine whether the time counted by timer TM**1** after receiving data code DC from center side data processor **4** elapsed or not. When the count time is exceeded, a data retention instruction is transmitted at step #**712** on the assumption that the printing is left in an interrupted manner.

FIG. **36** is a flow chart showing the contents of a copy cost process of step #**720** of FIG. **33**.

Referring to FIG. **36**, when image file DF and print condition PC are received from center side data processor **4** (#**722**; YES), the cost calculation process is carried out (#**724**). Control proceeds to step #**726** to determine whether output unfeasible information NP is set or not. When output unfeasible information NP is set (#**726**; YES), output unfeasible information NP is transmitted to center side data processor **4** (#**728**).

When output unfeasible information NP is not set (#**726**; NO), the calculated printing cost PF is transmitted to center side data processor **4** (#**730**).

FIG. **37** is a flow chart showing the contents of the cost calculation process of step #**724** of FIG. **36**.

Referring to FIG. **37**, the total amount of printing cost PF is initialized to **0** (#**732**). Also, the print unit cost which is the printing fee PF per sheet is initialized to **0** (#**734**). Control proceeds to #**736** to carry out a size unit cost calculation which is the calculation of the unit cost for each sheet size according to print condition PC specified by the user. Then, a sheet type process which is calculation of the unit cost according to the type of the sheet is carried out (#**738**). Then, an output color process is carried out which is the calculation of the unit cost of a sheet according to the output color (#**740**). These values are totaled to obtain printing cost PF (#**742**). When calculation of printing cost PF for all image files DF is completed (#**744**; YES), the main routine ends.

FIGS. **38**, **39**, and **40** are flowcharts corresponding to step #**736**, step #**738**, and step #**740** of FIG. **37**, respectively.

Referring to FIG. **38**, when the size of the sheet specified by the user is A**3** (#**752**; YES), the print unit cost is set to, for example, 20 yen (#**760**). When the specified sheet size is either A**4**, B**5**, or B**5** (YES in any of #**754**–**758**), the print unit cost is set to, for example, 10 yen (#**762**). When the sheet size specified by the user does not match any of the aforementioned sizes (NO in all #**752**–**758**), output unfeasible information NP is set (#**764**).

Referring to FIG. **39**, when the type of the sheet specified by the user is a normal sheet (#**772**; YES), the main routine ends. When the type of the specified sheet is a cardboard (#**744**; YES), 20 yen, for example, is added to the print unit cost (#**778**). When the specified sheet is a color sheet (#**776**; YES), 10 yen, for example, is added to the print unit cost (#**780**). When the type of the sheet specified by the user is neither a general sheet, a cardboard, nor a color sheet (NO in #**772**–**776**), output unfeasible information NP is set (#**782**).

Referring to FIG. **40**, when the output color specified by the user is monochromatic (#**792**; YES), the main routine ends. When the specified output color is monocolor (#**794**; YES), 20 yen, for example, is added to the print unit cost (#**796**). When neither of the case applies (NO in both #**792** and #**794**), 40 yen, for example, is added to the print unit cost (#**798**).

Referring to FIG. **41**, determination is made whether image retention information and data code DC are received from center side data processor **4** (#**802**). When the image retention information and data code DC are received, timer TM**1** for counting the time before erasing the image data for each user is set, and the counting is initiated (#**804**). The received data code DC is stored in memory **131** (#**806**). Data code DC stored in memory **131** is compared with data code DC entered by the user at copy machine **3**.

When information of reservation date RD is included in the received data (#**808**; YES), the received image file DF is stored in memory **131** (#**810**).

Then, determination is made whether start key **186** of operation panel **18** is depressed by the user at the site of copy machine **3** (#**812**). When start key **186** is depressed, control proceeds to #**816** to determine whether the charge is already transferred (YES), or the required amount of coin is inserted into coin inlet **222** (#**818**; YES). When all the other printing conditions are completed (#**820**; YES), the relevant timer TM**1** is reset (#**822**). Then, the print execution is initiated (#**824**).

When start key **186** is not depressed at step #**812**, determination is made whether an automatic print designation is received from center side data processor **4** (#**814**). When automatic print designation is received, the process of steps #**816** and et seq. are executed.

FIG. **42** is a flow chart showing the contents of a display process at user side data processor **5**.

Referring to FIG. **42**, when printing cost PF and printer information PI are received from center side data processor **4** (#**1002**; YES), printing cost PF and printer information PI are provided on display **51** (#**1004**).

Since the user can set print condition PC at user side data processor **5**, it is not necessary to manually set print condition PC at copy machine **3** in the above embodiment. Therefore, the time required for manipulation or caused by erroneous operation by a user unfamiliar with the manual operation of copy machine **3** can be prevented. Since printing cost PF can be identified before print out is executed at copy machine **3**, the user can alter the print condition PC when printing cost PF is too high. Furthermore, the problem of shortage of the amount for payment can be eliminated in paying the printing cost FP at the installed site of copy machine **3**.

Printer information PI including the information of a copy machine that allows printout according to print condition PC is provided on display **51**. Therefore, even in the case where printing cannot be carried out under the print condition PC specified by the user due to absence of a relevant feature in

copy machine **3**, the user can select a copy machine that satisfies the desired print condition PC from printer information PI. Therefore, a printout according to the desired print condition PC can be reliably obtained when the user goes to the installed site of the relevant copy machine **3**.

In the above embodiments, center side data processor **4** and copy machine **3** can be connected by a common network including user side data processor **5**. It is also possible to connect center side data processor **4** and copy machine **3** by an individual private line independent to the network connecting center side data processor **4** and user side data processor **5**. Also, one center side data processor **4** can be provided for one copy machine **3** and connection established therebetween. When the user requests printing from user side data processor **5**, image print information PD can be transmitted in advance to center side data processor **4** corresponding to the connected copy machine **3** that carries out printing. Alternatively, copy machine **3** and center side data processor **4** can be implemented integrally. Printing system **1** can be implemented as a client server system.

In this case, the user side data processor is the client and the center side data processor is the server. The printer is connected to the server.

In the above embodiments, the program for implementing the printing system is stored in the hard disk of the data processor. Alternatively, the data processor can read the recording medium incorporating the program for implementing the printing system to achieve the above feature using a general purpose computer.

Although a digital type copy machine **3** for printing image file DF is employed in the above embodiments, a single printer device can be used. More specifically, a printer device of high performance can be connected to center side data processor **4** for usage. Furthermore, various printer devices that allow print out of image file DF such as a device with facsimile function can be employed.

In the above embodiments, the structure, circuitry, function, operation method, process contents, and sequence of user side data processor **5**, center side data processor **4**, and copy machine **3** can be modified appropriately. Also, the contents, sequence, and division of the process of respective flow charts can be modified appropriately according to the concept of the present invention.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

What is claimed is:

1. A printing system comprising:

a memory storing print data,

determination means for determining whether payment of cost of printing said print data is completed or not, and

retaining period modify means for modifying period of retaining said print data in said memory according to said determination result.

2. The printing system according to claim **1**, wherein said retaining period modify means increases the retaining period of said print data when determination is made of completion of cost payment by said determination means.

3. The printing system according to claim **1**, said printing system comprising a printer and a processor, said printing system receiving a print request from a user side processor connected via a network.

4. The printer system according to claim **3**, wherein a payment method of said cost includes at least one of electronic money, electronic banking and electronic account settlement, said determination means making determination obtaining information indicating that the cost has been paid from the network.

5. A printing system connected to a user side processor via a network, receiving a print request from said user side processor, comprising:

reception means for receiving via the network information related to a print sheet input at a user side processor,

calculation means for calculating printing cost according to said information related to a print sheet, and

transmission means for transmitting said calculated printing cost to a user side processor via the network.

6. The printing system according to claim **5**, wherein said information related to a print sheet is a size of the print sheet.

7. The printing system according to claim **5**, wherein said information related to a print sheet is a type of the print sheet.

8. A printing system connected to a user side processor via a network, receiving a print request from said user side processor, comprising:

first reception means for receiving information related to a print job transmitted from a user side processor,

calculation means for calculating printing cost according to said received information related to a print job,

first transmission means for transmitting information of said calculated printing cost to a user side processor, and

second reception means for receiving from said network information indicating that payment of said print job has been completed by the user.

9. The printing system according to claim **8**, further comprising:

code information generation means for generating code information specific to a print job with respect to the print job information received at said first reception means, and

second transmission means for transmitting said generated code information to a user side processor.

10. The printing system according to claim **8**, wherein said cost payment is carried out by at least one of electronic money, electronic banking and electronic account settlement.

11. The printing system according to claim **8**, wherein said information related to a print job includes image data to be printed out.

12. A printer system connected to a user side data processor via a network, receiving a print request from said user side processor, comprising:

first reception means for receiving information related to a print job transmitted from a user side processor,

code information generation means for generating code information specific to a print job with respect to the print job information received at said first reception means, said code information being used for a user to receive a printed object,

a memory storing generated code information in correspondence with said print job, and

transmission means for transmitting said generated code information to a user side processor.

13. The printing system according to claim **12**, wherein said information related to a print job includes image data to be printed out.

14. The printing system according to claim **12**, further comprising second reception means for receiving information related to a payment method of printing cost input at a user side processor.

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UNITED STATES PATENT AND TRADEMARK OFFICE

CERTIFICATE OF CORRECTION

PATENT NO. : 6,516,157 B1
DATED : February 4, 2003
INVENTOR(S) : Syuji Maruta et al.

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Title page,
Item [57], **ABSTRACT**,
Line 8, "front" should be replaced with -- print --
Line 10, delete "8"

Signed and Sealed this

Nineteenth Day of August, 2003

JAMES E. ROGAN
Director of the United States Patent and Trademark Office